A WINDOW OPEN ON THE WORLD

The UNESCO Courier

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Karl von Frisch:

NATURE'S HIDDEN LANGUAGES OF SMELL

Unesco - C. Baugey

GODS OF ANGKOR VAT

Hundreds of figures of Tevedas or minor gods (above) decorate the walls of the Angkor Vat temple in northern Cambodia. The first city of Angkor and its great temple were built by a Khmer king, Suryavarman II (1112-52). A successor, Jayavarman VII, in 1181 founded a new capital, Angkor Thom, close by and adorned the great temple of the former capital (previously dedicated to the Hindu god Vishnu) with Buddhist decorations. He gave the great temple-fortress the title it still bears—Angkor Vat (the palace monastery). Archaeologists and engineers of several countries are working to restore and save Angkor's monuments, now threatened by diseases in the stones and ravages of time and weather.

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COVER PHOTO

The life of the bee has fascinated men since early antiquity. Yet only in recent years have we come to understand the amazing mechanism of the bee's sensory organs. In the article on page 4, Karl von Frisch reveals the important role of the bee's sense of smell. Photo shows a worker from a wild-bee colony returning to a hollow-tree nest, its legs heavily loaded with pollen.

From the film "Secrets of Life". (©) Walt Disney.

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NATURE'S HIDDEN LANGUAGES OF SMELL

by Karl von Frisch

© J. M. Baufle, Paris

Professor Karl von Frisch, famous for his discovery of the "language" of bees, recounts here some surprising facts about the sense of smell among insects and fish. Even in the "language" of bees, smell plays a vital role. Bee (left) extracting nectar from a flowering shrub, can direct other bees in its hive to this food supply by "dancing". The others identify the tree or flower by smelling the odour on the scout's body.

Some odours please us; others we dislike. To most people the perfume of a bunch of roses in a room is an agreeable odour but nobody would dream of putting an arum lily there in a vase, for it gives off a pungent smell of decay.

Nevertheless, men and animals do not find the same smells pleasant or disagreable. Moreover, many animals have a much keener sense of smell than human beings. For example, dogs, sniffing close to the ground, can follow a trail whose existence no man would ever have suspected. It has actually been shown that the fatty acids which make up a large part of the secretion of the human skin can be smelt by a dog in a solution a million times more diluted than that which the human sense of smell can detect.

There is nothing surprising in this if we compare human and canine anatomical characteristics. The nasal cavity, in which the olfactory cells are located, is particularly developed in dogs; the olfactory mucous membrane covers a far bigger area than it does in the human nose, and the nerve centres in the dog's brain which record and assimilate smell messages are much more developed. This is also true of many other animals. For nearly all mammals smell is more important than sight just as it is for many fish and for certain insects. Smell is the determining factor in their existence, guiding them just as we ourselves are guided by sight.

We must bear this in mind if we are to understand the behaviour of certain animals.

One particular case which has long intrigued biologists, giving rise to some strange hypotheses, is that of the bombyx butterfly. Entomologists have found how to catch large numbers of the extremely rare male bombyx butterflies with the help of a fertile female of this species placed under a wire-mesh cover.

The abdomen of the female bombyx contains a gland which gives off a smell quite imperceptible to us. When the female wants to attract a male, she turns this gland round and it diffuses an attractive scent. Now an insect's sense of smell is located in the antennae and any butterfly collector can distinguish at a glance a male bombyx from a female by the male's antennae, which are large and contain innumerable olfactory cells. The big penniform antennae of the bombyx show its highly specialized olfactory powers and correspond, anatomically, to the well-developed "smell receptors" in a dog's nasal cavity.

The male bombyx butterflies are attracted by the smell of the females. They are not at all interested in their

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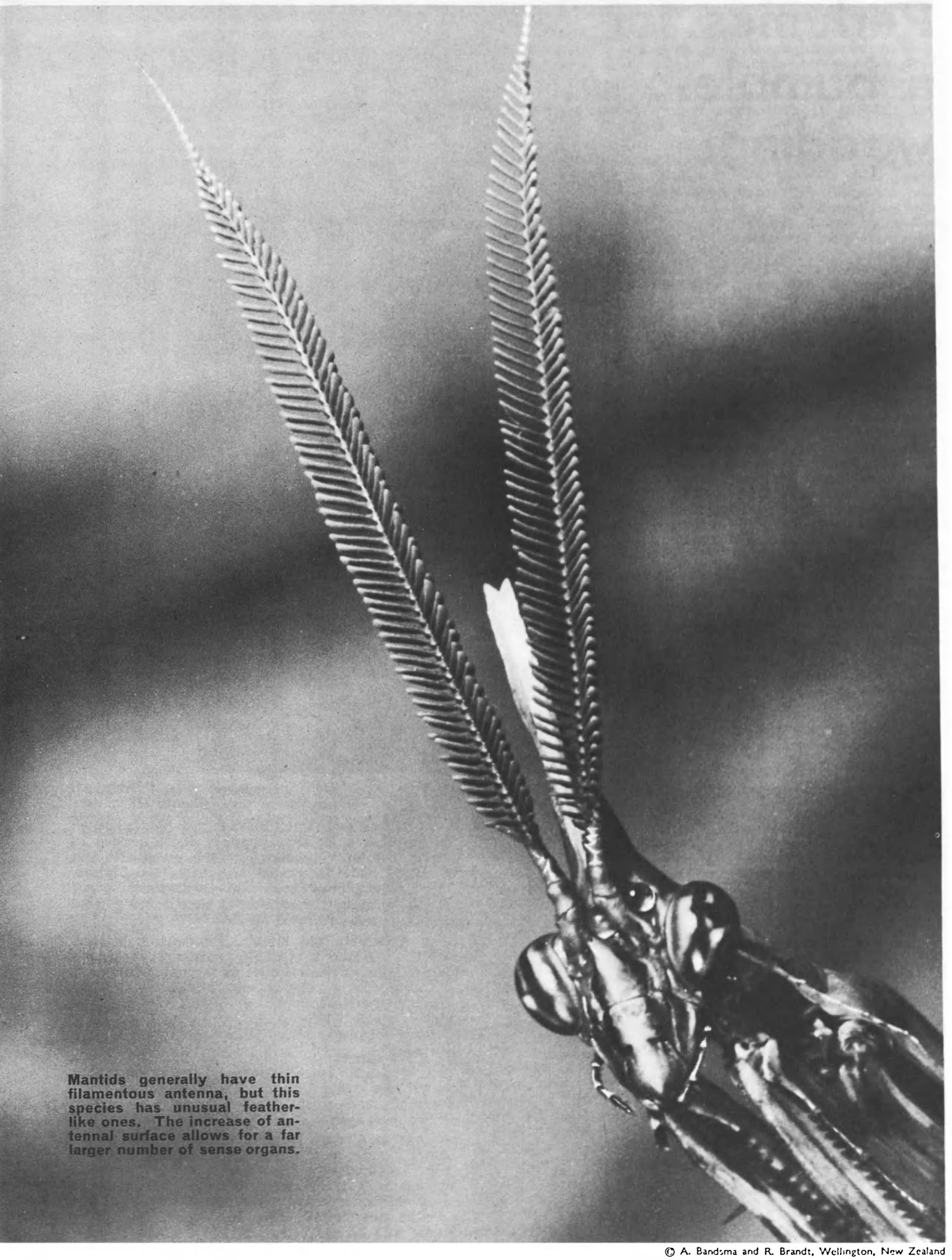
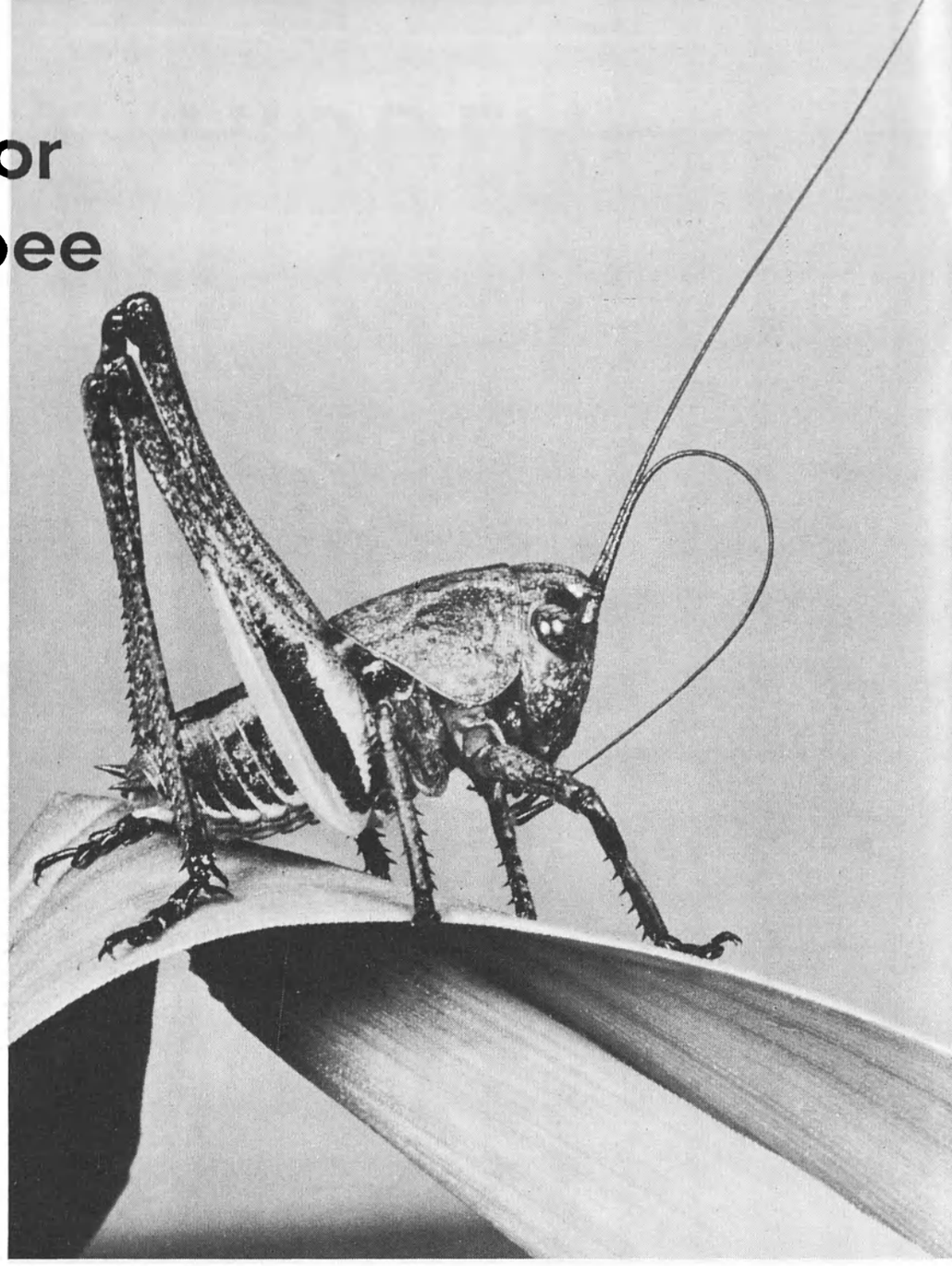


Mantids generally have thin filamentous antenna, but this species has unusual feather-like ones. The increase of antennal surface allows for a far larger number of sense organs.

© A. Bandsma and R. Brandt, Wellington, New Zealand

Perfumes for a bumble-bee wedding



ANTENNAE CLEANING TIME. Long-horned grasshoppers have long sensitive antennae which are continually waving about, "feeling" the path of these insects. Because of their important function they are kept meticulously clean. Here a grasshopper cleans its antennae.

© A. Bandsma and R. Brandt

appearance. For them, smell alone is the quintessence of feminine charm. This was proved by removing the scent gland from a female, a small operation which in no way altered her appearance, and then placing the scent gland beside her. The males which had been attracted to the spot turned their attention from the female to the gland, and tried to mate with it.

Another species of nocturnal butterfly whose males are attracted by the smell of the females is the mulberry-eating bombyx. The caterpillar of this moth is the silkworm, which has been bred by the Chinese for thousands of years. Silkworm breeders supply the worms with food (mulberry leaves) and the male moths with females. Sheltered from their natural enemies, the bombyx multiply freely, but as with other domesticated creatures, their natural instincts tend to deteriorate. The males no longer need to fly off in search of a mate. In fact they have one put under their very noses, or—more precisely—under their antennae. As soon as they smell the attractive odour, their wings begin to flutter and they rush towards the female.

Scientists have studied the chemical composition of this scent. After twenty years' investigation, a team of research workers led by Professor Adolf Butenandt, Nobel Prize Winner in 1939, succeeded in isolating the substance from the scent glands, and in analyzing its chemical composition. This difficult task was made all the harder because of the extremely small amount of odoriferous substance produced by the gland. No less than 500,000 females were needed to make 12 milligrammes of a pure extract of the substance which attracts the males. Its chemical composition is simple, being what is known as a non-saturated alcohol.

Once the formula was known, the research workers succeeded in making a synthetic substance which has turned out to be just as effective as the natural product. A minute quantity of it on the end of a glass rod brings the males hurrying along just a effectively as the presence of a female, which shows quite clearly that it is the smell which attracts the male towards the female.

With other species, the males produce the odoriferous substance which is love's messenger. One of these, the bumble-bee, for a long time managed to keep the secret of its amorous rendezvous, and the mystery was explained only a few years ago.

In a forest on a sunny spring morning, a male bumble-bee can sometimes be seen flying towards the base of a tree-trunk; he touches the bark here and there, and then flies off again. A few dozen yards or so further on, he lands on the lower branch of another tree and goes through the same performance. He touches the edges of the leaves with his jaws, flies off again, makes another

puzzling halt, and eventually returns to his starting point, after having flown round a wide circle in which he has made a number of mysterious landmarks.

The fact is that there is a scent gland at the base of the bumble-bee's jaws and the strange smell these glands give off is perceptible even to us. The bumble-bee has left traces of this smell on the bark and on the leaves during his morning flight. He will go round the circuit for hours on end, often from morning until night, stopping for a moment at each point and adding a drop more scent if need be. Elsewhere in the forest other males are blazing the same kind of trail.

Bumble-bees which were captured and marked, resumed their endless round as soon as they were set free. Hunger eventually drove them to feed off the flowers in the nearby fields but they quickly rushed back to their rounds. The bumble-bee's secret is that the females pick up the smell given off by the landmarks and wait for their ardent suitor at one of them.

As there are several species of bumble-bee in the same area, how can a female be sure that the "invitation card" she finds has been left by a male of her own species? Nature has provided for every contingency. The scent in the jaw glands of the male varies according to the species. As a further safeguard the various species follow different itineraries on their sentimental journeys. Some leave their scent on the lower branches of trees or on roots just showing above the ground. Some go to the leaves at the top of a tree. Others prefer gramineous stalks or grass in the fields. Instinct tells the females where to look for a male proposal.

The purpose of these alluring smells is the perpetuation of the species. But the part played by odours in the hunt for food is no less important. The attractive smell given off by flowers helps scores of insects to find food, and at the same time ensures the perpetuation of the plants. Two birds are killed with one stone, as it were, for the scent of the flower attracts the insects, which find nectar and pollen in the calyx. Flying from flower to flower, they carry the pollen which sticks to their bodies on to the stigmata of other flowers of the same species, thus ensuring the fertilization and the development of the seed.

As honey seekers, bees play an essential role in this fertilization. They gather the nectar not only for immediate food needs but also to build up stocks for the winter. That is why they fly unceasingly from flower to flower. Bees have another peculiarity: they are "faithful", each one adopting a particular species of flower. This is essential if pollenization is to be effective. but they can be faithful only if they are able to distinguish the chosen species with absolute certainty. The scent of the flowers, which varies with the species, plays a decisive role in their recognition. In addition, the scent has a special significance for the bees.

When one of the scouts finds a new supply of food—a lime-tree in flower for example—it returns to the hive and announces the discovery by dancing on the cells of honeycomb. This lively dance tells the other bees how far away the new supply of food is and in which direction it lies. Some of the bees gather round the dancer, and touching the messenger's body with their antennae, they pick up the smell of the lime-tree with which it is impregnated, and then fly off in the direction indicated. The scent of the flower thus plays an important role in the "language of bees."

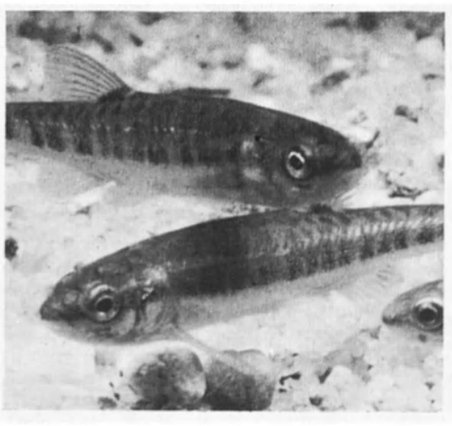
At the time when lime-trees are in flower and full of nectar, other flowers are in bloom too. And so the hive is divided up into several teams of honey gatherers, one of which deals with lime-trees, another with robinia, and a third with yet other flowers. The members of each team recognize immediately from the smell of the dancers if the message is meant for them or for another team. The members of each team identify one another in the hive through the scent of the flower which each bee gives off, and these specialized honey gatherers form tightly-knit communities. They stick together when resting, just as they do when at work.

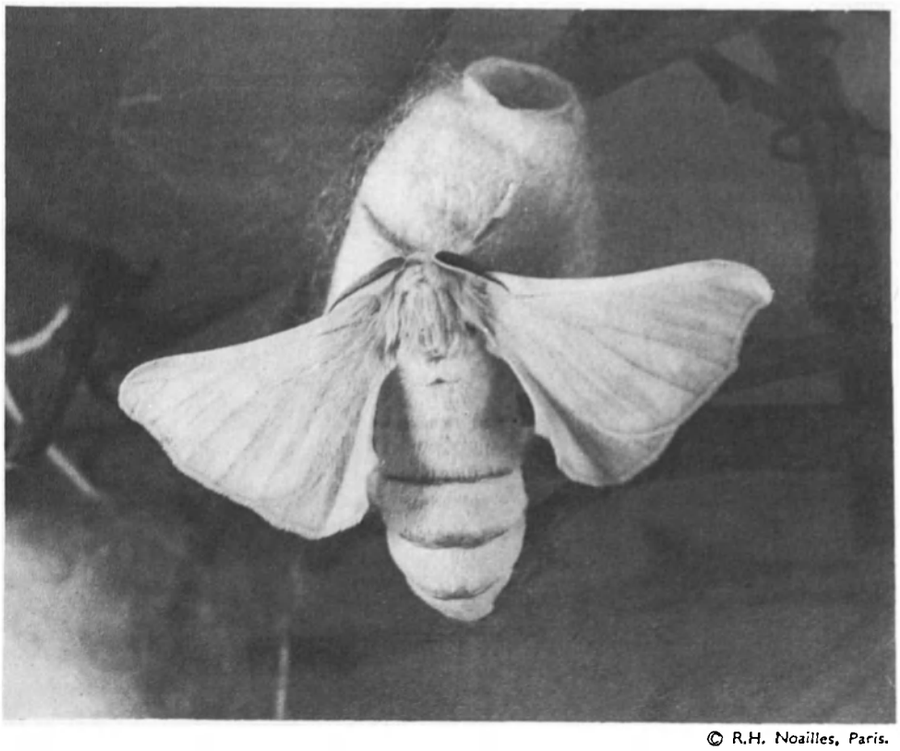
Not all flowers have a pleasant scent. Some give off an utterly repugnant odour and thus attract flies whose habits is to lay their eggs on rotting flesh. Scenting a familiar odour of decay, the flies are lured to these flowers and taken in in more senses than one. Here, nature's ingenious arrangement of the flower's structure keeps the flies prisoner and does not set them free until they are well powdered with pollen.

Yet the flies are not clever enough to learn a lesson from this unpleasant experience. Attracted by the same

CONT'D ON NEXT PAGE

SEDUCTION AND WARNING. The female of the mulberry-eating bombyx (the caterpillar of this moth is the silkworm) has a scent gland which secretes a substance attractive to the male of the species (right). Conversely, a substance in the skin of minnows if released by the slightest scratch is immediately "scented" by other minnows and causes them to flee for their lives—a timely warning if it is a pike that has begun to attack the shoal.





© R.H. Noailles, Paris.

Mr. Wasp taken in by an orchid

smell of putrefaction coming from another flower of the same species, they are taken in again and in this way the pollinization of the stigmata is assured.

Some orchids—amongst them the ophrys—are even more perfidious in their use of insects as pollenizing agents. The females of burrowing wasps—those of the gorytes species, for example—produce a special smell to attract the males, just as the females of the mulberry bombyx do. The flowers of the ophrys orchid have succeeded in imitating the smell of the female wasps. The males are attracted, they land on the flower and, completely deceived, they try to mate with it.

The illusion does not last for very long, but the contact has been enough to ensure the fertilization of the flower. The fact that these orchids produce no nectar is itself significant. They have, indeed, no need of this bait; their scent alone is enough to ensure the co-operation of the insect.

It is well-known that in the case of mammals, smell plays a vital role in the quest for food. The exceptional sense of smell in dogs and in other mammals has already been mentioned. It is far less well-known that fish, too, have a highly developed sense of smell. Their olfactory organs are not part of their breathing apparatus but are concerned only with the detection of smells.

Experiments have shown that certain fish can find their food and recognize members of their own species entirely by sense of smell, after being deprived of their sight. It is the eel which has the most highly developed olfactory organs, its sense of smell being on a par with that of the dog.

Some fish migrate over great distances and during their journeys make special use of their sense of smell. Salmon are often born in the fresh water of small streams and creeks flowing into rivers. The young salmon follow the river down to the sea where they spend several years, often far from the mouth of the river. Once fully grown, they return to the river and we still do not know how they manage to find their way back. Nevertheless, it has been proved by marking young salmon that not only do they reach the river they came from, but they also get back to the very tributary in which they were born.

The riddle has been partly solved today, for samples taken from different parts of rivers show that the smell of the water varies. This is no doubt due to differences in the geological formation of the river bed as well as to the diversity of water plants. It has also been proved that salmon which have been deprived of their sense of smell cannot find their way back to the stream where they were born. It is the "smell memories," then, of its earliest youth that urge the salmon to make its way back to its birthplace.

We have seen that smells can be used as a bait. They can also be used as a means of scaring other animals away.

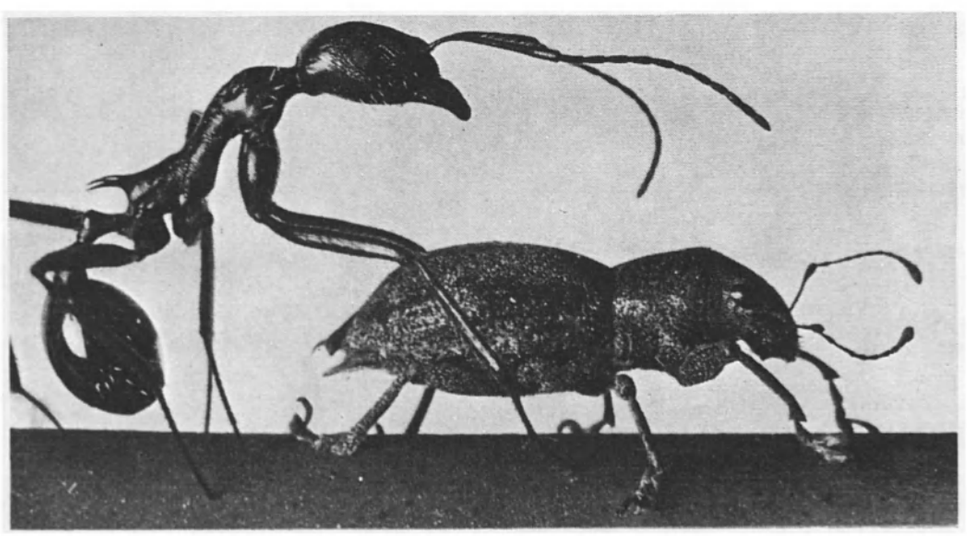
In North America and in South America there are several varieties of skunk, a relative of the badger. When attacked, they squirt out a jet of foul-smelling oily liquid, which is secreted by the anal glands. A man who has been unlucky enough to be sprayed by this liquid is not fit company for some time afterwards, even though he may take a bath and change his clothes.

Many insects too have adopted this method of defence —amongst them, the stink bugs. Some brightly-coloured species are spared by insect-eating birds, for they have glands which secrete an unpleasant-smelling liquid. It has recently been discovered that they very successfully protect themselves, in much the same way as the skunk, against such enemies as ants.

I could go on giving examples but I would rather mention a case in which a protective smell of this kind sowed panic amongst the members of a same species.

I was carrying out some experiments on the sense of hearing in fish, and had trained a shoal of minnows to pick up sounds made below the water near the shore of the Wolfgangsee. I had to check whether all the members of the shoal used the same feeding ground, so I caught one of the minnows and, with a needle, severed a small muscle, the destruction of which makes the tail turn a very dark colour. I then put the fish into the water again.

No sooner had it joined up with the other fish than something quite unexpected occurred. The minnows panicked, sought refuge on the bottom, grouped together again, and then fled into deeper water in the centre of the lake. For several days they were very timid and wary and it was only after repeated distribution of food that they again became as familiar as they had been before.



From the film "Secrets of Life", © Walt Disney

ANT DAIRY-MAIDS. Many ants keep "cows"—sap-sucking insects such as aphids—and feed on their excess juices. They take out their "livestock" to graze on plant stems and roots and later bring them back to the nest in the same way as this ant dairymaid herding closely a tiny scarabaeid beetle.

© Atlas

© R.H. Noailles

IN HIVE OR FIELD the bee is an industrious worker who has many surprising lessons to teach man. The male bees or drones are born from unfertilized eggs laid by the queen bee. Inside the hive the female worker bees keep a strict control over the proportion of the sexes in the colony and decide when to get rid of the drones. Left, worker bees dispose of the larva of a drone. Right, a worker bee sucks nectar from a flower with its long tongue.

Could the wounded minnow have told the others about his unpleasant experience? Obviously not. A beheaded minnow caused just the same panic, and so did one that had been minced into small pieces. In fact, the filtered juice from these small pieces was enough to scare the shoal away.

I tried to find out from which part of the body this warning came, and finally decided that it lay in the skin. So far it has not been possible to isolate the substance contained in the skin. All that is known is that it must be soluble in water and that fish can smell it. Normal minnows are very sensitive to it whereas minnows which have been deprived of their sense of smell are quite unaffected. An extract taken from a tiny piece of skin is enough to put a whole shoal of tamed fish to flight. Even the minute quantity diffused in the water following a needle prick—as had been the case when I noticed the phenomenon for the first time—has this effect.

We can hazard a fairly close guess at the biological significance of the phenomen. Minnows are preyed upon by many types of fish and their greatest enemy is undoubtedly the pike. When a pike catches and devours a minnow, its numerous sharp teeth are bound to scratch and tear the minnow's delicate skin, and the panic-creating substance spreads into the surrounding water. Thus, any minnows which happen to be near are warned of the danger; they flee and remain on the alert for some time. It is for this reason that a pike does not get a chance to destroy an entire shoal.

I was interested to find out if the phenomen is peculiar to minnows, or if this strange form of "life insurance" is practised amongst other fish. Exhaustive experiments have since shown that it is unknown amongst sea fish, but that it is very common amongst fresh-water fish, being limited, however, to the group which zoologists call "ostariophysi." All fish related to the carp—i.e. the cyprinides and the siluridans, many kinds of which are to be found in America, Asia and Africa—belong to this group. The skin of the fish of all these species contains a warning substance which is released by a scratch, and which produces the same effect as the one noticed in the case of the minnows.

It has also been shown that the warning substance from minnows acts upon other members of the cyprinides family, but its power decreases with the remoteness of relationship. The same experiments have made it possible to verify suggestions based on anatomical data concerning the race history relationship of the ostariophysi group of fish.

Whereabouts in the fish is the warning substance produced? Recent microscope research has shown that there is a particular type of unicellular gland in the skin cells only of those fish which produce the warning substance. The secretion from these glands is not released unless the skin is scratched. We may presume from this that the glandular cells make up the warning substance itself, and that it is their function to send a rapid farewell message of warning to the rest of the shoal when one of its members is seized by some marauding fish.

Dr. Karl von Frisch, *world famous zoologist, was awarded the Kalinga Prize for the Popularization of Science in* 1959. *Former director of the zoological institutes of Rostock, Breslau, Graz and Munich, he is the author of "The Dancing Bees" and "Bees, Their Vision, Chemical Senses and Language."*

At the Great Temple of Abu Simbel

FORGOTTEN for many centuries, engulfed by desert sands and finally rediscovered in 1813, Abu Simbel is still a storehouse of secrets. What mysterious purpose determined the activities of the engineers who executed the orders of Rameses II? Why does it embody such curious lighting effects which can hardly result from mere chance? With what intent was the interplay of rock and sunlight so expertly combined?

At a time when Unesco is leading a world campaign to save these unique temples from being swallowed up forever by the swiftly-rising waters of the Nile (See THE UNESCO COURIER, Feb. 1960 and Oct. 1961) one special aspect of the Great Temple deserves closer study: the relationship between its structure and the rising sun.

The facade of the great temple faces east, but not due east; it runs slightly north-east/ south-west. Throughout the year it receives the first rays of the sun practically full on as soon as the sun rises from the hills lying on the opposite bank of the river.

The sun first lights up the frieze of baboons, over six feet high (there were once 22 of them) topping the temple facade. The Egyptians had observed that baboons are in the habit of uttering loud cries just before sunrise. In Egyptian mythology they became the helpers at the birth of the god Re every sunrise after his dangerous journey through the darkness of the underworld.

At dawn the Sun god leaves his nocturnal bark for the ship of day and resumes his triumphal journey through an eternally blue sky. The cohort of baboons dances with joy to celebrate his victory over the lethargy of night.

A few moments later, the rising sun is greeted by what seems to be his own image: the god Re Horakhti (the sun rising on the horizon) standing in an oblong niche beneath the cohort of baboons above the high doorway leading into the underground temple. His falcon head is surmounted with the sun disc from which a cobra spits fire. On his left hand and on his right, the pharaoh offers up the supreme gift of an absolute sovereign: the image of Maat, goddess of balance, of justice and of truth.

But is the statue really that of Re Horakhti? Under his right hand is a dog-headed sceptre (in Egyptian "user") and, under his left hand, the traces of a small statue of Maat, which is difficult to recognize today but which appeared clearly in the drawings made at the beginning of the 19th century when the temple was rediscovered.

These elements, with the name of the god himself, complete a rebus of the name Rameses chose for himself when he acceded to the throne: User-Maat-Re. Thus, here is an identification of the pharaoh with the god—just as, thousands of years later at Versailles, another "sun-god", Louis XIV, identified himself with Apollo.

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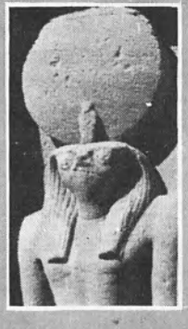
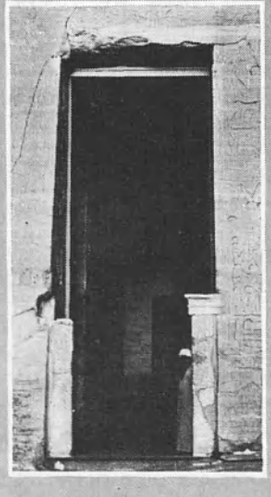
DANCING BABOONS
As the sun rises over the mountains it lights up a frieze of baboons atop the façade of the temple. Thus begins the first act in the mysterious relationship between the sun and the temple that has long intrigued egyptologists. In Egyptian mythology the baboons salute the sun god, dancing with joy to celebrate his new victory over night.



THE SUN GOD
Moments later a new phase begins in an ingenious reconciliation of religious symbolism and architectural creation. Sunlight bathes the statue of Re Horakhti, the sun god, standing in a niche above the entrance to the underground temple, his falcon's head surmounted with the sun disc decorated with a cobra. The Pharoah, Rameses II, identified himself with this god.

Photos Unesco-Almasy

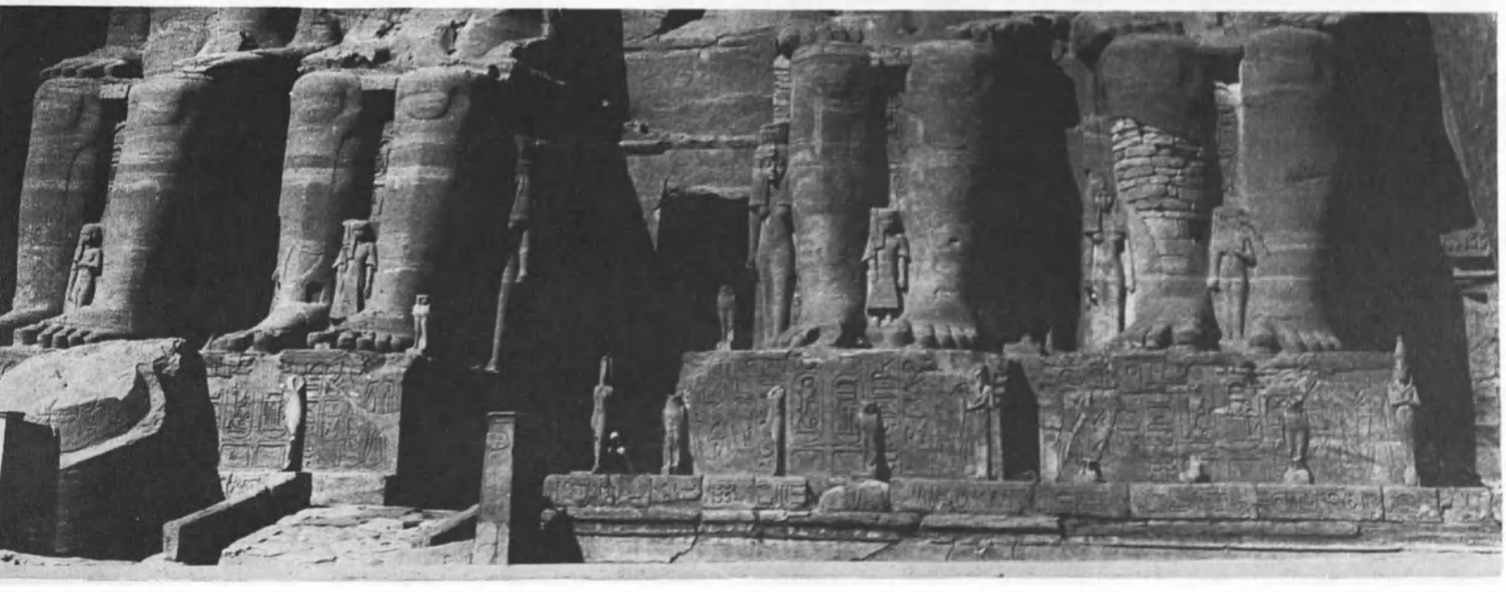


INTO THE MOUNTAIN
Still rising, the sun shines full upon the four giant statues of Rameses that form the façade. The next phase, as the rising sun penetrates, at certain times of the year, within the temple, eventually reaching the sanctuary 200 feet from the threshold, evokes the enigma of Abu Simbel. Why did the Pharoah's priests and astronomers choose this site in Upper Nubia to carve out the great temple? Was the construction of the galleries and chambers deep within the mountain "married" purposefully to the yearly course of the sun in such a way that its first rays reach the gods in the sanctuary at fixed dates? And why are these dates significant?

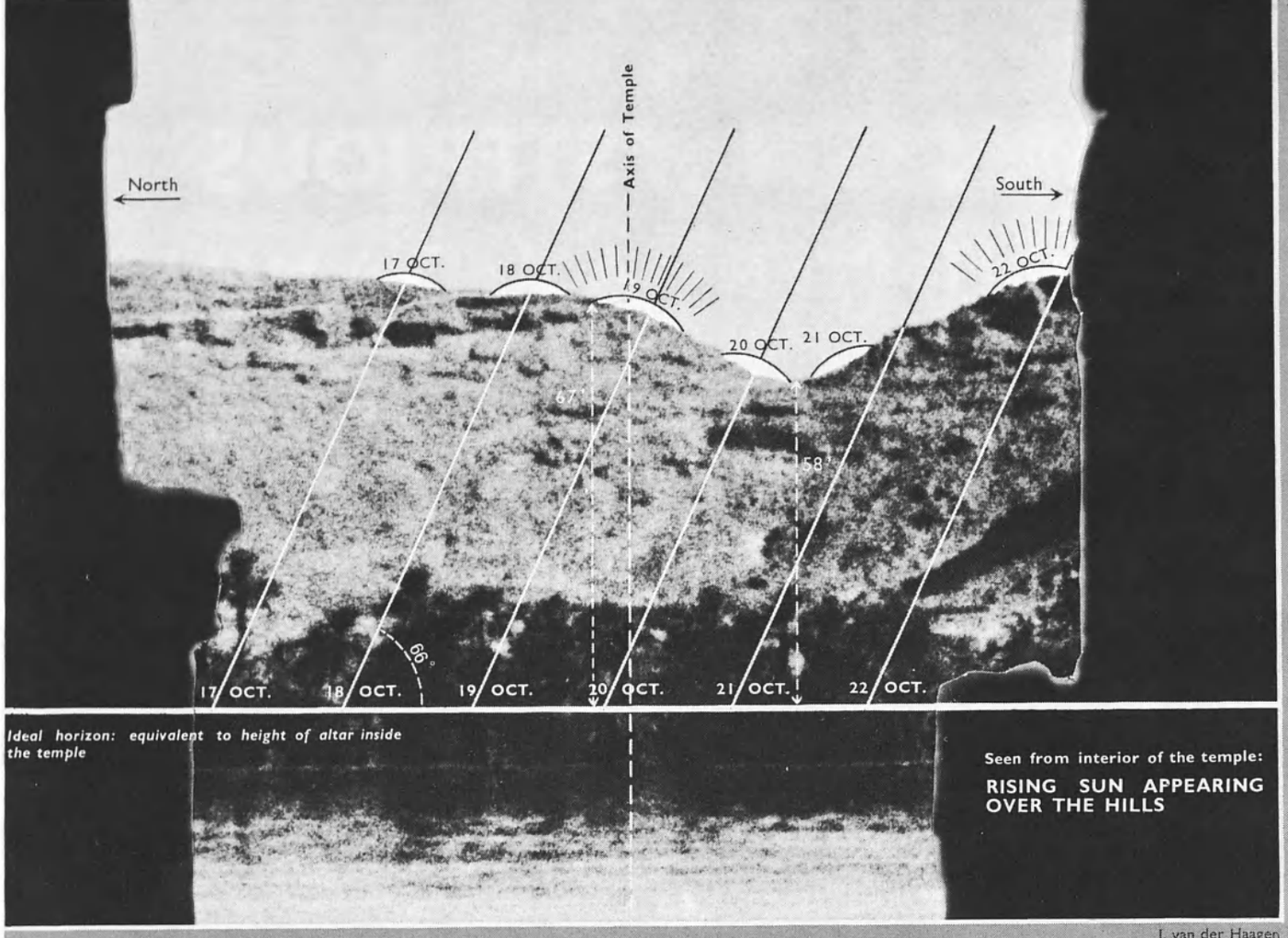
Unesco - van der Haagen

RAMESES' MYSTERIOUS ENCOUNTER AT DAWN

by Jan K. van der Haagen

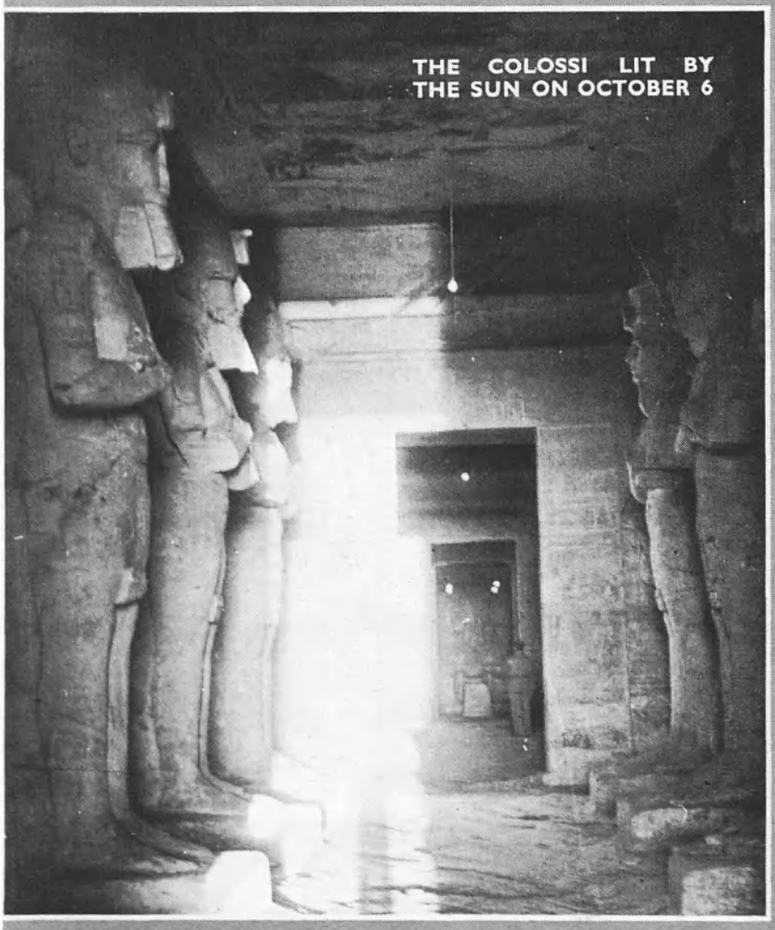


WITH THE SUN IN THREE ACTS

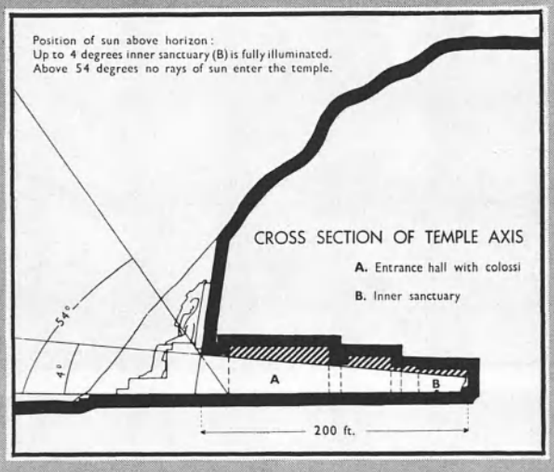


J. van der Haagen

NEW LIGHT ON AN ANCIENT RIDDLE



Unesco-van der Haagen



Inside entrance hall (A in drawing on right). Inner sanctuary is in far background (B in drawing).

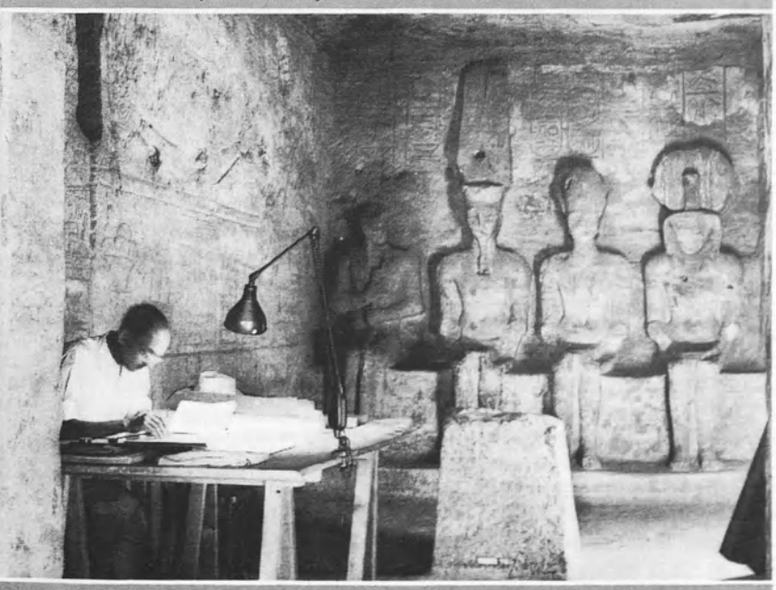
The sudden illumination of the statues of the sun gods in the sanctuary deep in the heart of the rock at Abu Simbel is a breathtaking spectacle. Its religious meaning is clear: divine light seeks out from within the bowels of the earth "he who holds divinity within him". But what is the deeper significance of the dates, in February and October, when this phenomenon occurs? Perhaps the whole vast undertaking of constructing the temple was linked with the important ceremony that took place on the Jubilee of Rameses II in the 30th year of his long reign. Other evidence suggests a link between the temple and a brilliant star in the constellation of Orion which, about 1260 B.C., rose in the vicinity of the axis of the temple. Photos on these pages show how astronomers, builders and engineers enticed the rising sun to illuminate the colossi inside the entrance hall (left) and finally reach the gods seated in the sanctuary (right).

RAMESES THE KING-GOD

On rear wall of sanctuary his statue is completely illuminated by the first rays of the sun twice each year.

National Geographic Institute, Paris

Below, left to right, seated behind the sanctuary altar: the gods Ptah, associated with the underworld (never lit by the sun), Amon, Rameses and Re Horakhti.



Unesco-Almasy

A faint glimmer on the wall

A few moments later, still rising, the sun lights up the colossal statue of King Rameses (more than 65 feet high) who has now discarded his divine metamorphosis. While it was customary to place the statue of a sovereign close to the entrance of a temple built on his command, here, at Abu Simbel, the entire facade actually consists of the four statues of the king.

Between the moment when it lights up Re Horakhti and the moment when it shines full upon the statues of Rameses, the rising sun reaches the entrance of the temple. Its first rays faintly illuminate the upper part of the wall at the back of the famous chamber of statues. This chamber or entrance hall corresponds to the "first court" in classic Egyptian open-air temples. It is divided into three aisles by a double row of four pillars against each of which stands a statue of the pharaoh.

Although these pillars are generally called "Osirian", they represent Rameses and not Osiris. It is true that the pharaoh holds in his hands the crook and the scourge which are the attributes of Osiris, sovereign of the Empire of the Dead, but these objects had already long become the insignia of royalty.

In conformity with the classic Egyptian plan, the corridors become narrower and narrower, and the successive chambers smaller and smaller, the ground sloping upwards as the roof slopes downwards.

Viewed from any spot on the globe, the sun is seen to rise at the same point only twice a year. Consequently, in the underground temple of Abu Simbel the play of light deep within the earth varies constantly. When the summer solstice comes round and the sun rises to the north of the axis of the temple, the seat and legs of the statue of Rameses on the facade to the north of the entrance prevent the first rays of the sun from penetrating the temple, and a little later in the morning it is the lintel of the doorway that serves as a screen.

Not until September 10 do the sun's rays reach the face of the first colossus on the left in the big chamber. On the following days they reach further in, and a photograph which I took on October 6, 1959, shows that the last colossi on the southern side were the first to receive the light.

The culminating point of the cycle lies between October 10 and 30, during which period the first rays of the sun reach the last chamber, the holy of holies, situated in the heart of the mountain 200 feet from the threshold. It is at this time that the sun-gods seated against the back wall are illuminated, either separately or in pairs, and each totally or partially according to the date.

These gods are Amon, the sun-god of Thebes (the capital at the time), Re Horakhti and, seated between them, a god among gods. Rameses himself. The god Ptah, one of those who preside over funeral ceremonies, is not entitled to the divine light and, except for his left arm, he remains in perpetual darkness.

Henri Bonneval, leader of the Geographical Institute of Paris expeditions, who made the photogrammetric recordings of all the temples in Egyptian Nubia, has established that the sun appears on the horizon exactly in the axis of the temple on October 19 and on that day its first rays largely illuminate Amon and Rameses.

As autumn draws to a close the sun's first rays reach the colossi on the north side and finally those seated nearest the entrance. After November 30, the sun is once more banished from the sanctuary. But less than a

CONT'D ON NEXT PAGE

Search for a forgotten star

month after the winter solstice, on January 20, it shines inside once again, and in January, February and March, the phenomena just described take place in the opposite order. Amon and Rameses are reached by the first rays on February 21.

The sudden illumination of these statues deep underground is breathtaking. Its religious implication seems clear: divine light seeks out from the very bowels of the earth the man who holds divinity within him. As the temple seems deliberatly to have been constructed on an axis not exactly at right angles to the facade—which had to run according to the cleavage plane of the rock—the question arises as to whether the dates of February 21 and October 19 have a particular significance.

The spring equinox (March 21 or 22) and that of autumn (September 22 or 23) immediately jump to mind. Searching for an explanation of the difference of one month. I wondered whether the phenomenon called the precession of the equinoxes might not be involved. In the Platonic year, which lasts nearly 26,000 ordinary years, the celestial poles describe wide circles, finally returning to their point of departure. Thus the entrance of the Pyramid of Cheops was orientated according to the French astronomer Camille Flammarion towards a star which then played the part of the pole star. Similarly, might not the axis of the great temple at Abu Simbel be orientated towards a point which today has no particular significance, but which, when the temple was built, was that of the rising sun at the time of the equinox?

ASTRONOMY soon brought me the proof that the precession of the equinoxes played no part here; so I had to look for another explanation. Could the dates of October 19 and February 21 have been of special importance in Egypt in the time of Rameses II?

The French Egyptologist, Louis Christophe, who retraced the history of the construction of the underground temple, after detailed studies of the figures carved on the facade and the bas-reliefs inside, concluded that the decoration of the oldest parts must have been completed before the 26th year of Rameses II's reign, and that of the principal chambers before the 34th. The temple would thus have been built towards the time of the sovereign's Jubilee, in the thirtieth year of his reign, the famous Heb-Sed.

The Heb-Sed was one of the important ceremonies in Egypt at the time of the Pharaohs and probably the survival of a prehistoric custom which consisted in putting the head of the tribe to death with great pomp lest he become senile and harmful to the community. On the occasion of his Jubilee, the Pharaoh had to prove that he was still in full possession of his faculties, after which he was enthroned as his own successor.

According to Louis Christophe, the first sculptures at Abu Simbel are, as it were, a tentative move to identify Rameses with the sun-god. The identification grew closer as his reign proceeded, to become complete in the 30th year. But what was the exact date of Rameses first Jubilee? It seems to be unknown. Nevertheless, the Jubilee was followed by others at much shorter intervals and we know that the fifth and sixth Jubilees of Rameses, who reigned for nearly 70 years, were celebrated during the first days of the fifth month of the civil year. In 1260 B.C. that day corresponded to our own October 22.

From this fact, Louis Christophe concluded that the building of the temple was begun with the Heb-Sed in mind, and that it was on that solemn day that the Pharaoh had been deified.

It will be noticed that there is a difference of two or three days between the date of the royal Jubilee established by Louis Christophe and the date at which the sun rises in the axis of the temple. Perhaps it is possible to reduce this difference to one or two days.

Here is how I think this may be done. It seems probable that the astronomer in Thebes or Memphis who was asked to determine the exact point where the sun rises on October 22 at Abu Simbel did not know details of the site—Memphis, for example, is nearly 800 miles from Abu Simbel. The astronomer may in consequence have based his calculations on an "ideal" horizon situated on the same level as the temple. In reality the sun rises at Abu Simbel about five minutes after it crosses the "ideal" horizon since on the right bank of the Nile, about 3,600 yards from the temple, there runs a chain of hills sufficiently high to delay the sun's appearance.

Moreover, since, in the month of October and at that place, the orbit of the sun makes an angle of about 66 degrees with the horizon, the first segment of the sun's disc appears at a slightly more southern point than that where the sun clears the "ideal" horizon. The problem is further complicated by the fact that the crest of hills is far from level and at one point dips steeply.

But does the "astronomical error" really provide a full explanation? Even taking into account the phenomenon which led to the introduction of the bissextile year, it is evident that a discrepancy of at least 24 hours exists between the day the sun rises in the axis of the temple and the date of the Jubilee. Now, if Louis Christophe's theory is correct and the temple offers proof of the deification of Rameses II on the day of the Heb-Sed, the date on which the first rays fully illuminate the statue of the king is much more important than that on which the sun rises in the axis of the temple.

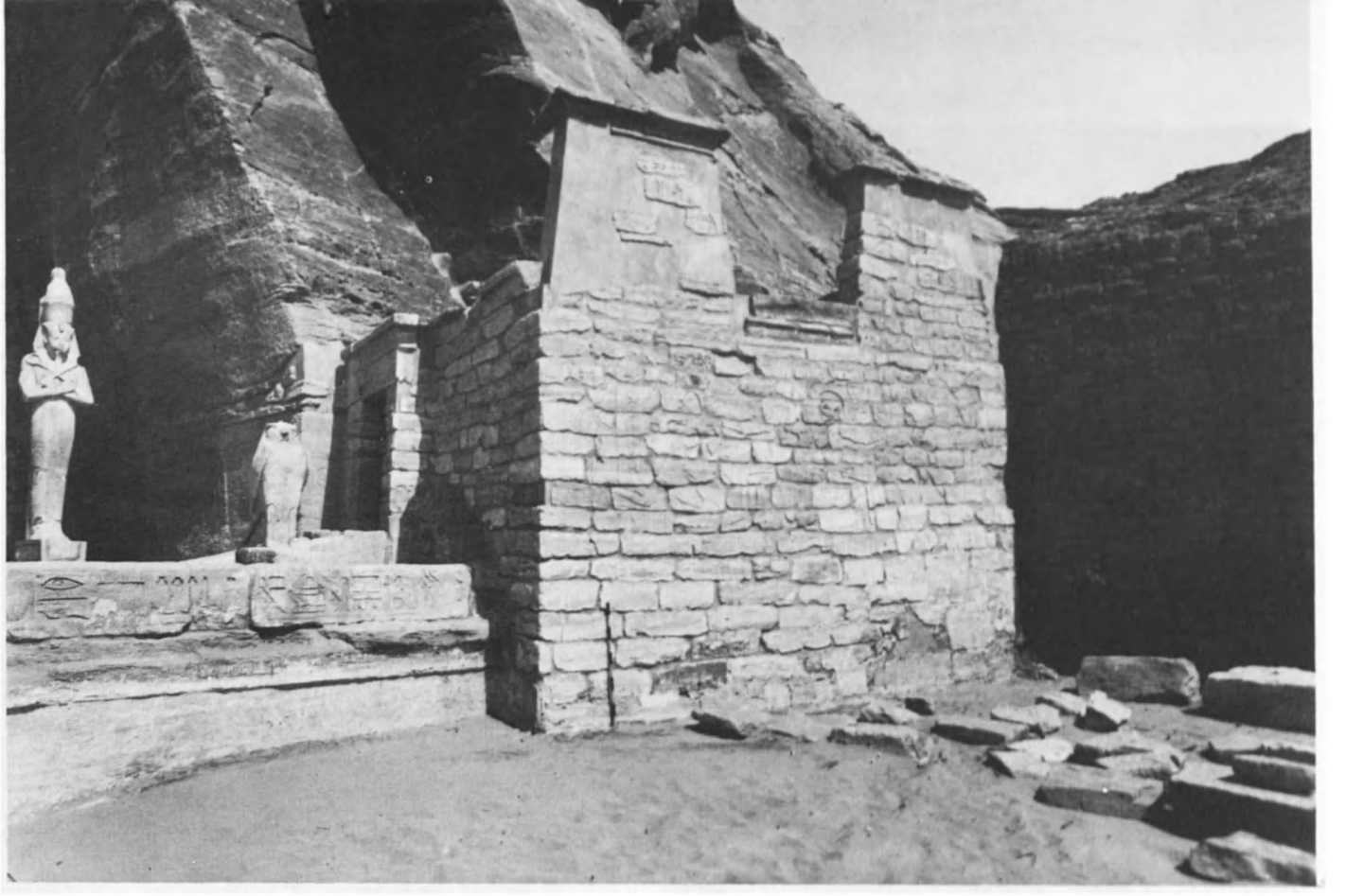
The rays of sunlight do so a little after October 19, and a photograph taken on October 21, 1961, shows the sunlit statue of the king. Taking into account the difference of one day which we have just mentioned as a possible "astronomical error", this brings us to the day of the Jubilee. At the same time, the fact that the depression in the crest of the hills is not in the axis of the temple, but slightly to the south of it, takes on particular significance. On October 21 and 22, the sun seems to keep its point of rising as long as possible in the neighbourhood of the depression as if to give its first rays the longest possible opportunity of lighting up the sun-god.

This explanation, of course, is based on the assumption that the ancient Egyptians had great ability in the fields of theory and practical skills. We know this was already the case one thousand years before Rameses. Moreover, once the main lines of the undertaking had been established by calculation, it was still possible for the builders to make rectifications. The size of the statues, for example, enabled them to regulate the play of light precisely—as it happens the statues are not all the same size. For this reason it would perhaps be wiser to believe that around the year 1260 B.C., the Heb-Sed fell, not on October 22, but on the day we now call October 21.

THERE remains another hypothesis—the possibility of there being a link between the temple and the fixed stars. Although the precession of the equinoxes does not change down the centuries the direction in which the sun rises, it is equally true that the appearance of the night sky was very different 3,000 years ago from what it is today. One may reasonably wonder whether the axis of the temple was not related to the appearance of a star which was important to the Egyptians.

At my request, Henri Bonneval carried out research on this question and his findings are astonishing: for a number of years around 1260 B.C., an exceptionally brilliant star in the constellation of Orion did in fact rise in the immediate vicinity of the axis of the temple.

Orion was one of the rare constellations in ancient Egypt that modern astronomers have been able to iden-



PRIESTLY VIGIL IN THE CHAPEL OF RE HORAKHTI. At the northern end of the temple terrace at Abu Simbel stands a little building known as the Chapel of Re Horakhti. What was its original purpose and why was its axis pointed nearly 30 degrees south instead of at right angles to the terrace? One of the hypotheses outlined by Jan van der Haagen following his intensive historical and astronomical research throws new light on this question. The chapel appears to be orientated in such a way that a priest posted in the centre of the chapel would, at the moment of the winter solstice, see the rising sun exactly in its axis. Until now there has been no direct evidence that the Egyptians determined the solstices. Photo, Documentation Centre on Ancient Egypt

tify with certainty. Everyone is familiar with the three brilliant stars of Orion's belt, known for centuries as the Three Wise Men. The middle star, the one we are concerned with, bears the Arabic name of Alnitam.

Today, thanks to the famous "astronomical ceiling" on the tomb of Senenmut in the necropolis of Thebes, we know that Orion, or rather, the three stars in Orion's belt, were of great significance to the Egyptians. Various texts also make it clear that Orion (Sah for the Egyptians) was identified with Osiris, the god of resurrection. "Osiris has reappeared in Orion" says one of the texts of the pyramids.

It seems that the Egyptian calendar was based on the heliacal rising of Sah and Sothis (our Sirius). The 200-feet-long tunnel formed by the temple was obviously an invaluable aid in determining the moment when the rising star first appeared in the faint light of dawn. The tunnel formed an ideal screen against the rays of the sun when it rose immediately after the star.

There is yet another hitherto unsuspected relationship between the great temple at Abu Simbel and the yearly course of the sun. At the northern extremity of the terrace which runs along the great temple, a terrace bordered with statues which represent Rameses and Horus the Falcon alternatively, there is a curious small edifice without a roof. The eastern facade has something of the form a pylon and the building is known as the Chapel of Re Horakhti.

A small staircase and door lead up to it. In the centre of the building stands what is generally called an altar. However, this altar is not intended for offerings. A stone staircase leads up to it and the priest in office, surrounded by four stone baboons, one in each corner, could watch a particular point on the horizon from between the crennels. The baboons and the small obelisks standing to the north and to the south of what is conventionally called the altar (now preserved in the Cairo museum) prove that it was indeed a sanctuary consecrated to the sun.

But there is something unusual about this building. Its orientation is very different from that of the terrace and consequently from that of the great temple. The little temple is orientated further to the south.

What is the reason for this? I wondered whether the axis might not have been orientated in such a way that the priest looked straight at the point where the sun appears in the winter solstice—a point which makes an angle of 116 degrees with the north. Vital information on this point came from the Geographical Institute of Paris. The axis of the small temple makes an angle of about 118 degrees with the north. The difference of two degrees is negligable considering that the axis of the small temple is only a few metres long.

Finally, we may recall that the eastern wall of the little chapel has the form of a pylon. According to the theory advanced by Mrs. C. Desroches-Noblecourt (Chair of Egyptian Antiquities. Ecole du Louvre, Paris) the pylon embodies an ancient Egyptian myth about the creation of the world and does so to celebrate the winter solstice and the rebirth of the young sun-god who succeeds Osiris.

What will remain of the play of light between the sun and the temple when Abu Simbel has been raised over 200 feet—a height about equal to the towers of Notre Dame Cathedral? The line of the horizon to the east will be a little lower, and in consequence the baboons will greet the sun five minutes earlier than they have been doing for centuries. But, as three thousand two hundred years ago, with a difference of barely one or two days, the rays of the sun will light up Rameses and the sun-gods at fixed times, leaving Ptah in eternal darkness.

JAN K. VAN DER HAAGEN, *former chief of the Museums and Monuments Division in Unesco's Department of Cultural Activities, is now director of Unesco's Nubian Monuments Service. He is the author of works on 18th century landscape painting in the Netherlands and on iconography.*

Feast during the grape harvest (10 ft × 3 ½ ft).

NIKO PIROSMANI

Still life (small painting: 27 × 8 in.).

UNKNOWN MASTER OF PRIMITIVE ART

A beauty from Ortastchal (46 in. × 20 in.).

NIKO PIROSMANASHVILI, or PIROSMANI (1860-1917). A photograph published in a Georgian review in 1916.

IN every age and land there have been painters who in all simplicity and without special study have sought to express their picture of the world in paint. They were little interested in being classed as artists and in fact they were not recoginized as such since their works clashed with the artistic canons of their time and were not considered "beautiful."

But the present half century, for the first time since the Renaissance, has witnessed the disintegration of the more or less official rules of academic art as the existence and importance of hitherto neglected forms of art came to be appreciated, such as the Romanesque, Pre-Hellenic, Oceanian, and African art, the art of ancient civilizations unearthed by archæologist as well as that of prehistoric man.

by Jean A. Keim

Subsequently, art historians also began to turn their attention to a style of painting termed "simple-hearted painting" in Germany, "primitive painting" in the United States and Yugoslavia and "naive painting" in many countries.

This variety of labels shows how difficult it is to find a suitable classification for those unsophisticated artists for whom the world was a great canvas to be reproduced as simply as possible. Perhaps a better name might be the one used as the title of a Paris exhibition in 1935: "Popular Masters of Reality."

The most famous of these artists was a Frenchman, the Douanier Rousseau, whose paintings are now eagerly prized by museums the world over. But when Rousseau held his first major exhibition in Paris in 1912 his canvases were greeted with sniggers of scorn by the fashionable critics of the day.

SINCE then countless other such painters have been discovered, some good, some bad—for simplicity alone does not make a great artist. A fairly representative selection of their works was shown at the New York Museum of Modern Art in 1938.

Today many pages would be needed to list all the painters who can be grouped in this same category yet whose works are as markedly different one from another as Dietrich of Switzerland, Generalic of Yugoslavia, Greffe of Belgium, Guillen of Nicaragua, Hyppolite of Haiti, Metelli of Italy, Grandma Moses of the United States of America, Ociepka of Poland, Paps of Germany, Pasada of Mexico, Shalom of Israel, Theophilos of Greece, Urtiaga of Peru, Vivancos of Spain, and Wallis of Great Britain.

Each day brings us the name of a new artist, of greater or lesser talent, as well as many unsigned works the authors of which are now being sought by art collectors. A number of these painters are of exceptional merit yet their names still await the world recognition they fully deserve. Foremost among these is the Georgian popular painter Niko Pirosmanashvili, or Pirosmani as he is known for short.

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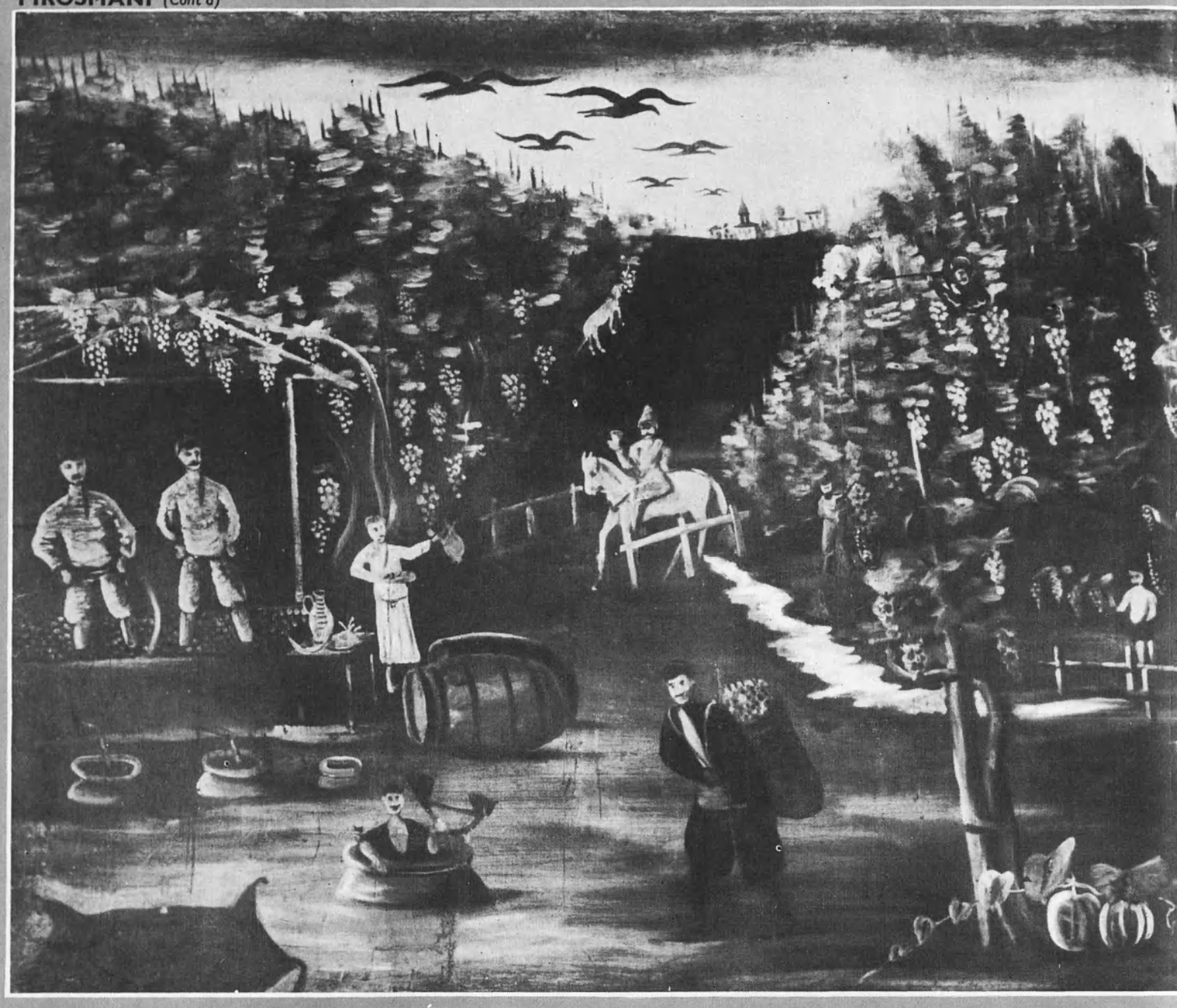
THE COOK (42 in. × 18 in.). Niko Pirosmani often chose his models from the simple folk he knew best.



AUTUMN DAYS AND HARVESTS

In Niko Pirosmani's works the same themes appear time and again—scenes from rural life or of craftsmen at work, sometimes arranged in anecdotal groups. Above, "Harvesting": from the grape and fruit harvest to the wine press. The painter was fond of poetic touches like the autumn pumpkins (foreground) and the flight of migrating birds (left rear). Painting at right is entitled "The Childless Millionaire with Poor Woman and Her Children" (52 in. × 45 in.). As canvases for his paintings, Pirosmani employed a wide range of materials including wood, tinplate, black oilcloth and shop walls. Strikingly rich colour characterizes his work.

20 **MARGARET THE ACTRESS.** (3 ft. 10 in. × 3 ft.)
This striking primitive painting is aglow wih colour.

AL FRESCO FEAST. Though he himself often went hungry, Niko Pirosmani was fond of painting others at table, thus combining portraiture with studies of still life. Above, a vintager, detail from "Feast During the grape Harvest" a painting reproduced on page 16.

In a dark cellar, a lonely man

Pirosmanashvili was born in 1860 in a small village in the Kakhetii district of Georgia. When he was still a boy his parents died and he found himself alone in the world. He made his way to Tiflis, the capital of Georgia, where he found work with some small traders and taught himself to read and write. But all the time he was doing sketches and drawings.

In 1882, at the age of 22, he joined up with a painter and opened a small paint business but his commercial sense was very poor and he was soon forced to close shop. He then found a job as a labourer on the railways, and later opened a small dairy and finally a butcher's shop, but all these ventures ended in failure.

Alone in the world, without either friends or relatives, Pirosmani lived a miserable, hand-to-mouth existence. He wandered about Tiflis trying to scrape a bit of money together by decorating restaurants and cellars, and painting signboards. It was not long before his health failed and he sought refuge from his frustration and bitterness in alcohol. In the words of one authority, Professor Dudchava, "he drank to paint and painted to drink." More often than not he received no money for the work he did; instead the tradespeople paid him with food and drink, estimating that it was cheaper to allow Pirosmani to decorate their walls with frescoes than to hire an ordinary house painter to redo their walls.

In 1912 he was discovered by a French artist named Le Dentre, then by the Zdanevich brothers of Tiflis, painter and poet respectively, and Pirosmani's name began to be mentioned in art circles. In 1916 the Union of Georgian Painters expressed concern about him and sent the painter Gudiashvili to try to help him. Gudiashvili has left us a description of him as "a very tall, grey-haired man with a small beard and drooping moustache; pale and exhausted by his life, but gentle and serene; his jacket and trousers covered with paint stains; living in extreme poverty in a dark cellar."

One day, when a meeting was in session at the headquarters of the Painters' Union at Tiflis, the door opened and Pirosmanashvili walked in. He sat down, folded his arms and stared dreamy-eyed in front of him. Only once did he open his mouth during the discussion. "Well, brothers" he said, "Do you know what we need? We've got to build a big house in the centre of town where we can all meet, buy a big table and a samovar to keep us going, and talk about painting." He later left, never to return. A Tiflis newspaper published a photograph and then a caricature of him. This apparently infuriated him and he decided to break with his fellow painters.

Some time afterwards the Union again sought to come to his aid, but Pirosmani had left Tiflis and disappeared. The search for him went on in vain. When he did return he was a dying man. Three days later a friend found him lying in a cellar and had him transported to a hospital. There he died on May 5, 1917. His place of burial is unknown.

Pirosmanashvili was a noble-hearted, proud man who never complained of his sad fate. His works are simple and unsophisticated; he painted what he saw, as it stood, with a purity of feeling and lyricism which reveal his true love of mankind. In all his painting one senses his deep attachment to ordinary folk, and the vitality of his decorative art is vividly expressed in a combination of brilliant colours, sharp greens, bright yellows and intense blues often set against a background of deep black.

Again and again he painted the same themes, on request, depicting scenes of abundance and plenty which he himself had rarely known: *Harvest Festival; Gay Feasts; Banquet Under the Trees.* But in the apparent gaiety of these scenes his own inherent melancholy can always be felt.

His models were the simple people he knew: the *Innkeeper*, the *Cook*, the *House Porter.* Today, their portraits strikingly illuminate a gallery of the Tiflis Museum. He painted the *Noble Lord*, the *Wealthy Peasant Holding*

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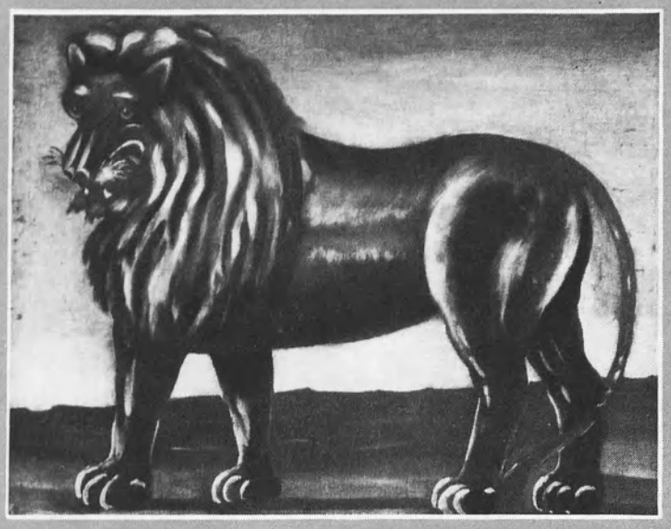
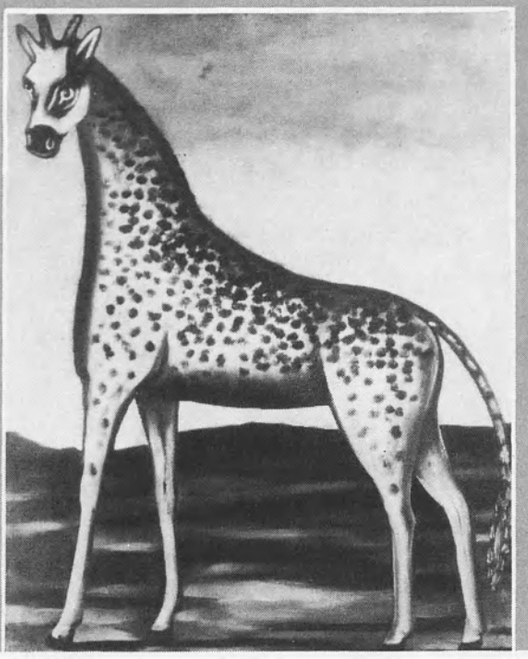
PANORAMA OF HUMBLE LIFE AND NOBLE DREAMS

This painting, "Religious Festival", which measures 17 ft. × 3 1/2 ft. is one of many huge-sized works for which Pirosmani had a predilection. Below, "The Tavern". Right, "Three Princes Feasting in a Meadow".





LION AND GIRAFFE. Animals were one of Pirosmani's favourite subjects and, like the Douanier Rousseau, he painted many that he had never seen in the flesh.

a Riding-Crop, the *Millionaire with a Poor Woman and Her Children*, and later a *Protest Meeting*... perhaps an unconscious gesture of revolt against the social conditions of his time.

He had a great love for animals and portrayed them in many works. He painted bucks and does, like *The Wounded Hind;* bears and cubs as in the magnificent *She-Bear Under the Moon;* eagles, as in *Eagle and Hares;* and even a *Lion* and a *Giraffe*.

For Pirosmani also painted subjects he had never actually seen. Though his whole life was spent in and near Tiflis he has left us some remarkable scenes like the *Port of Batum*, a *Hunting-Party in India*, and views of the *Russo-Japanese War*.

Steeped in the history and legends of his country, he painted portraits of *Tsarina Tamara*, and the Georgian national poet *Rustaveli*, and illustrated salient passages from the *Man in the Tiger-Skin*. He also painted innumerable still lifes showing shashlik on a skewer, Georgian vegetables and fish, and the traditional glass of red wine.

Although he was Georgian to the core, Pirosmani's works stand apart from those of his contemporaries which were completely dominated by European influences; nor can they be placed in the tradition of the ancient frescoes which adorn Georgian churches. A born genius, his style was all his own, and without affectation he painted what his heart led him to paint.

After the Revolution, the Soviet Union began to give prominence to his work. In 1930 his pictures were exhibited in Tiflis, Moscow, Leningrad, Kiev and Kharkov, and in 1938 and in 1960 important exhibitions of his works were held in Tiflis. Many poems have been written about him, and his life is the subject of a play now being performed at the Rustaveli Theatre in Tiflis.

Years after his death a renown has come to this "ill-starred" painter which he did not seek and certainly never expected. Special tribute to Pirosmani was paid to the artist in 1960 with a retrospective exhibition of his paintings in Tiflis Museum. In the catalogue published on that occasion, the director of the Tiflis Museum, Academician Amiranashvili wrote: "In the history of modern Georgian art prior to the Revolution, the work of Pirosmanashvili stands out as a great milestone. And it is to Soviet art criticism that we owe the present understanding and appreciation of his painting."

But far beyond Georgia, by virtue of his genius and humanity, Niko Pirosmanashvili belongs to world art.

THE HOUSE PORTER (portrait, 42 in. × 18 in.).

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24 JEAN A. KEIM, *former Cultural Attache at the French Embassy in Moscow, is a member of the International Association of Art Critics.*

BUILDING A FUTURE FOR YOUNG ARAB REFUGEES

by Richard Greenough

HOWEVER it is examined, in human, political or simply numerical terms, the problem of the 1,180,000 Arab refugees living in Jordan, Lebanon, Syria and the Gaza Strip seems as far away as ever from solution. In fact, those closely associated with the problem admit that it has, year by year, taken on a more stubborn and a more chronic nature in terms of any ultimate solution. The situation remains explosive, charged with highly inflammable emotion.

But having said this, it is agreeable to be able to report that a determined and constructive start has now been successfully made by means of vocational training, towards equipping some of the young men and women with skills which will enable them to lead useful and productive lives.

An encouraging aspect of this work is that it is being greeted with interest and enthusiasm, especially among the younger refugees, and that the Arab host governments are also, in general, supporting the projects with facilities for land, local services and funds from the more than $5 million a year they are allocating for overall assistance including UNRWA.

Since 1950 UNRWA—the United Nations Relief and Works Agency—has been providing food, shelter, health, welfare and educational services for the Palestine refugees. Education which now reaches a total of more than 200,000 children in 398 of UNRWA's elementary, preparatory and secondary schools, situated mostly in the 57 camps where 40% of the refugees live, or in government schools subsidized by UNRWA, and taught by some 4,000 teachers, is being carried out with UNESCO providing technical responsibility.

UNRWA

HOMEWARD BOUND from school, these Arab girls are some of the 3,000 children being educated in UNRWA-Unesco schools now operating within the Aqabat Jaber Camp outside Jericho in the Jordan Valley.

EXISTING education services are being improved and expanded wherever possible by more and better trained teachers, by more classrooms to avoid double-shift schools, and by new streamlined teaching methods. Refugee children are, in principle, guaranteed nine years at elementary and preparatory schools with opportunities for three more years at secondary school.

But over and above this, great new emphasis has now been placed on long-range plans for vocational and teacher training centres. These plans, to produce any real impact and to achieve the expected snowballing effect, are predicated on and must continue far beyond the present UNRWA mandate due to end in June 1963. UNRWA also regards this vocational training as more than just training for an occupation but as an alternative form of secondary education much more suited to the great majority of young refugees than the normal academic secondary course.

Specifically and thanks largely to $4.5 million subscribed during World Refugee Year (1959-1960), a three-year, $8 million programme is well under way which will:

(a) Expand vocational and teacher training among the Arab refugees to a point where UNRWA can turn out 2,000, possibly 2,500, graduates a year compared with 300 in 1960.

(b) Increase the number of scholarships awarded annually to students in Middle East universities from 90 to 180.

(c) Improve the agency's basic elementary and secondary education programmes partly as a means of supporting the two previous steps and of properly relating this to the educational trends of the host countries.

(d) Continue a modest loan-grant programme of helping qualified refugees put their acquired skills to productive uses in enterprises of their own.

This $8 million is part of a $16 million increase over the regular annual UNRWA income of some $34 million voluntarily subscribed by 41 countries.

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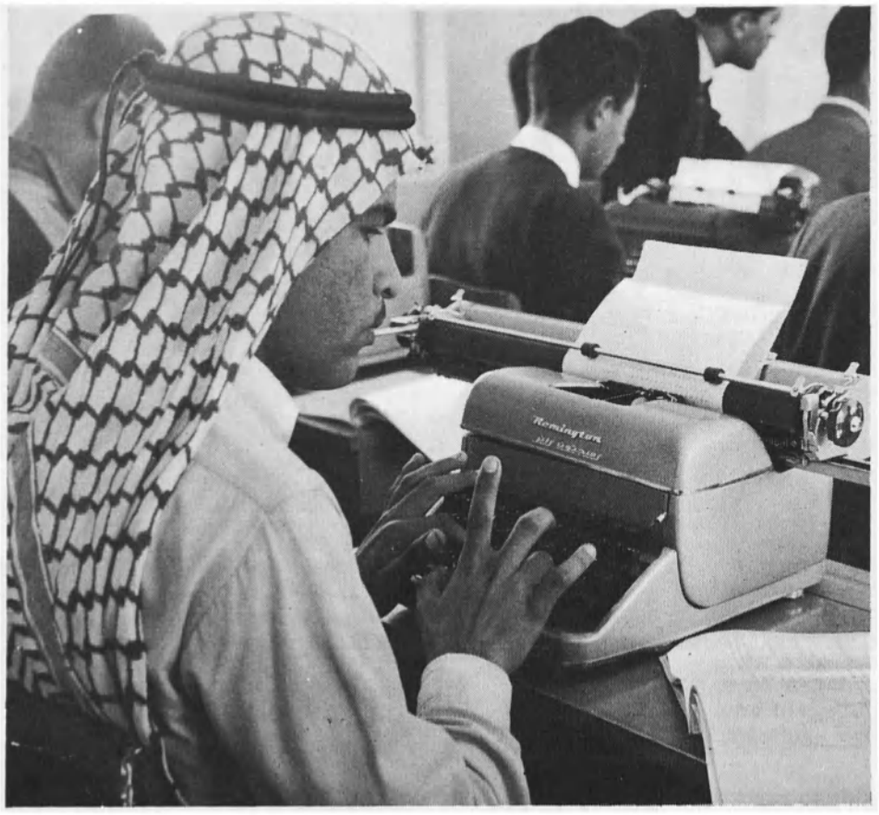


MANY SKILLS & TRADES are taught to young Arab refugees in the string of vocational training centres set up in four Middle East countries by UNRWA in co-operation with Unesco. Above, a trainee reaches for an electric arc-welder in the Kalandia Centre where more than 20 trades are taught. Left, typing practice for some of the students attending the commercial course.

Training for 22 trades & professions

However, all this should be considered against the grey background of the fact that the refugee population increases by about 30,000 a year—30,000 more children become adult, their places being taken by 30,000 to 35,000 new babies each year.

The whole Arab refugee problem has thus, with time, shifted to the younger adults as more children grow to maturity each year. Today of the 1,180,000 refugees, approximately half are children under 18, half adults. Of the nearly 600,000 adults depending on UNRWA, three out of five have reached adulthood as refugees. The problem is also compounded by the fact that maturing refugees have hitherto been given so little chance adequately to develop their latent productive talents that this deficiency is, in itself, a major contributing cause to the continuous increase in the number dependent on UNRWA. The tragedy of this situation is not accurately reflected in this rate of increase, but must be evaluated in terms of idle hours, vanished hopes, wasted talents, thwarted lives.

But UNRWA feels the picture is not hopeless. The talents of these maturing young men and women can be salvaged and put to constructive use.

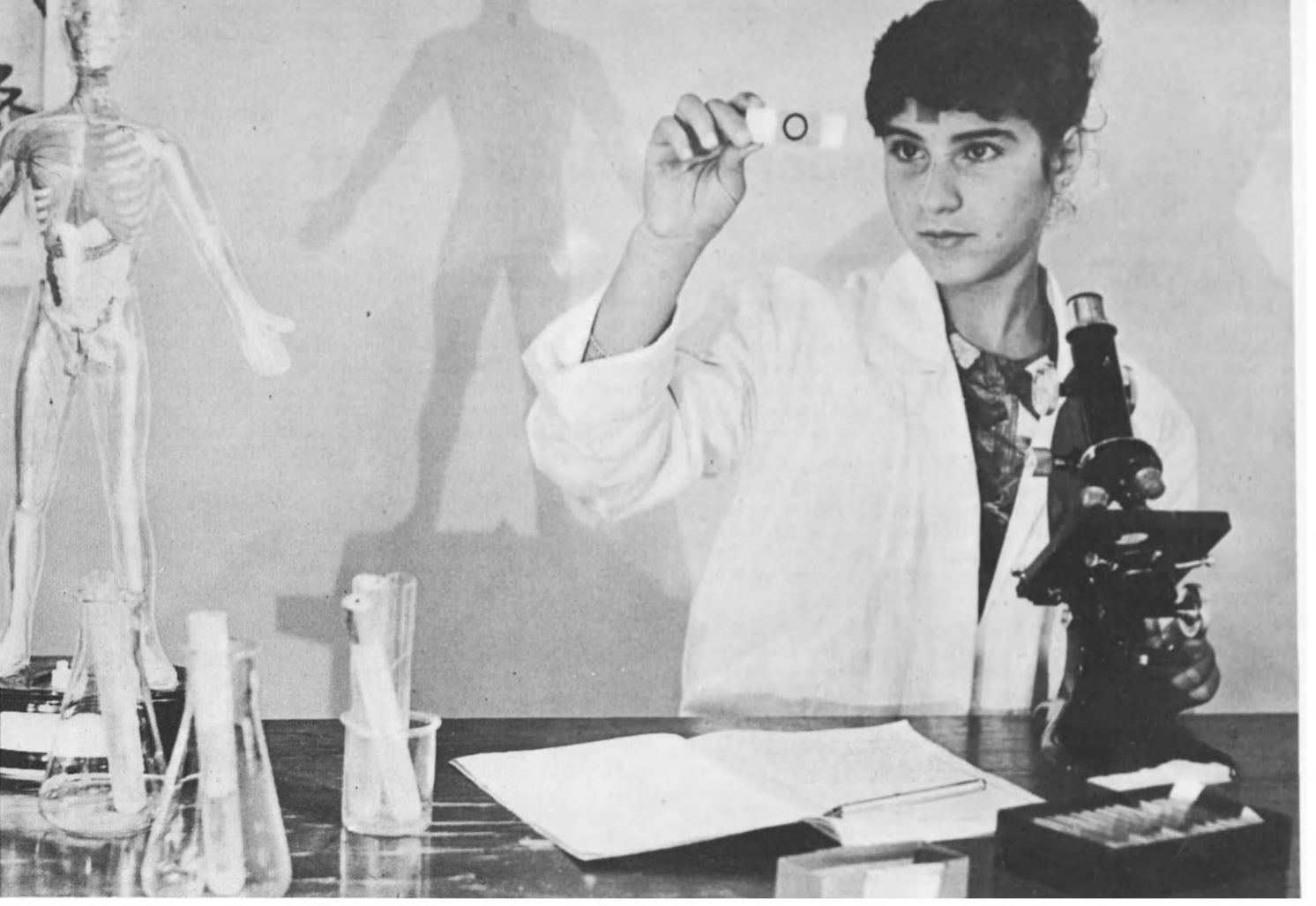
In the words of Dr. John H. Davis, of the U.S., Commissioner General of UNRWA: "The three-year programme of UNRWA is not intended to be a solution of the Palestine refugee problem. Rather it is based on the humanitarian premise that young refugees should be, and must be, given an opportunity to put to useful purpose the basic talents with which they have been richly endowed... It is important to bear in mind that specialized training, in and of itself, in no way prejudices the ultimate solution of the refugee problem, in that young persons reaching maturity will need specialized skills regardless of where they may ultimately live." In other words, try to ease a situation where the bottleneck of refugees anxious to go out and make their way in the world is forever growing tighter while the bottle of refugees grows bigger.

So UNRWA, with co-operation from Unesco in the form of 24 international education experts drawn from 12 countries to help and train the Arab instructors at the centres, has now established a string of vocational and teacher training centres through the four Middle East countries. UNRWA has its own team also of 28 international education experts at these centres.

Nine centres are now working. A training capacity of nearly 4,000 young men and women—633 of them girls—is aimed at by next academic year, with an annual graduation from then on of 2,000 to 2,500 students. Of these some 1,700 will be for special vocations, the rest will become teachers. All trainees are selected from among those refugees entitled to draw rations on the form of food supplies of a basic subsistence rate of 1,500 calories a day in summer, 1,600 in winter. Of the 1,180,000 registered refugees, about 870,000 are entitled to these rations, and of the balance who are not so entitled because they earn a self-supporting wage, all but a very few are nevertheless entitled to medical, welfare and other UNRWA services.

In this part of the world where the Bible is the ordinary man's Baedeker, the sites of these nine centres are almost as rich in historical association as some of the refugee camps, which can be found in Jerusalem itself, Bethlehem, Hebron, Nablus, Jericho, Damascus, Aleppo, Baalbek, Tyre, Sidon and Gaza.

The nine centres are situated: one in Lebanon, at Siblin near Sidon; two in Syria, at Homs towards the north and on the outskirts of Damascus; two in the Gaza Strip, at Gaza itself and at Beit Hanoun; four in Jordan, one in



UNRWA Photos

NURSING STUDENT studies microscope slides at a refugee training centre. A pre-nursing course has also been introduced for 16-year-old girls who, if they do not choose to take up regular nursing, may instead specialize in child care, midwifery or public health services.

Wadi Seer on the high ground above the capital, Amman, one at Kalandia and two at Ramallah, both places a little way out of Jerusalem on the old Roman road to Nazareth. At Ramallah are the men's teacher training college and also, opened September 1962, a combined teacher training and vocational centre for girls, the latter a pioneer of its kind in the Middle East. It will ultimately have a capacity of 633 and is housed in fine, hewn stone buildings in 20 acres of hillside given by the Ramallah municipality for a nominal rent of I Dinar ($2,80) a year, complete with 1,050-old olive trees.

Twenty-two trade and professional courses, mostly two years, some one, are offered the men. They include carpentry, building, surveying, radio/TV, auto, electrical and general engineering, sheet metal work, welding, telecommunications, accountancy and commercial courses. The favourite courses, nearly always oversubscribed by three requests for every vacancy, are radio/TV and auto mechanics.

The selection of courses is based on the best information presently available to the agency with respect to employment prospects in the area. They are planned on a flexible basis so they may be modified as more adequate information becomes available. A word on this matter of job placement later.

Six types of courses are offered to the women. Typing, shorthand, secretarial work, known as "office arts" to avoid any suggestion of direct competition with the men's commercial courses; home and institutional management; infant leader courses for day nurseries and the like; various types of dress design and dressmaking, known rather unglamorously as clothing construction; pre-nursing; and hairdressing, manicure and pedicure.

The last presents special problems in the Arab world according to Miss Marie Geldens, of Holland, chief UNESCO expert in vocational training for girls. Hairdressing training must be aimed at first chiefly for home attendance as the western idea of women going to hairdressing salons has only been adopted in very few places in the Arab world. "But the habit is slowly growing and more salons will open up," said Miss Geldens.

Nursing as a career for women is still rather looked down upon in the Arab world and women who have regularly tended men patients in hospitals find their stock quoted low in the marriage market. As a result this pre-nursing course has been introduced to interest girls while they are still young, 16 or so, as the top age limit for entry into the centre is 19, in the hope that if they don't choose to take up regular nursing, they may specialize in children's nursing, midwifery, public health or become doctors' secretaries.

As with the men's courses, there has been no lack of applicants for the girls' centres at Ramallah. For the 300 vacancies this current year in both teacher and vocational training, there were over 600 applications.

One heartening factor in the UNRWA-UNESCO education and training programmes is the growing number of Arab girls in school at all levels, and, more important, those who remain in school now instead of dropping out as so often in the past for work at home, in the fields or an early marriage. The attraction of vocational training that this UNRWA-UNESCO centre at Ramallah has pioneered in the Middle East is gaining ground especially now that the entry of women into teaching has become an accepted fact in the Arab world.

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For a more prosperous Middle East

As to the finances of this three-year programme and for the future of the vocational and teacher training programmes, most of the new centres and the expansion of existing ones were financed through the $4.5 million gathered during World Refugee Year, over 80% of it subscribed by three countries, the USA, Canada and the United Kingdom, plus extra donations from the governments of Kuwait and Morocco. Cost per trainee is $500 per 11 months academic year.

To train the 2,000 students will cost $2 million during 1962 and 1963. Encouraged by the results of World Refugee Year, UNRWA's chief, Dr. Davis decided to appeal to voluntary organizations, private persons and in some cases to governments, to "adopt" these refugees by buying scholarships for them to attend the centres at the rate of $500 per head per year.

The result has been encouraging. Funds have come from such divergent sources as the United Steelworkers of America and the Finnish Girl Guides ; from a community of North American Indians living in Canada and a group of voluntary organizations in New Zealand; from the Arabian American Oil Company (ARAMCO) and U.N. staff associations; from Swiss cheesemakers and the Oxford Committee for Famine Relief.

Obtaining a job after finishing the courses is a crux of the whole training programme. Placing teachers presents few problems. Besides going into the Agency's refugee schools where there is always a need for more and better equipped teachers, there is now a steady demand for trained teachers throughout the Arab world and recently, the total output of nearly 500 teachers trained over a period in UNRWA-UNESCO colleges, was absorbed not only in the refugee schools but in Kuwait, Saudi Arabia, Qatar and Libya.

WITH regards to the graduates from the vocational centres, where hitherto only a maximum of 300 a year have so far had to find, and have found jobs, UNRWA believes that the increased output can be absorbed into a Middle East which is now undergoing rapid technological development. The real test of this will come, of course, when the first 2,000 or so come on the labour market next year.

From surveys made by UNRWA placement services, there seems reason to be optimistic. In the various host countries, those in charge of national development projects as well as private industry have apparently expressed readiness to take on trained refugees in addition to their own native citizens.

In Syria, for example, Mahmoud Hamad, director of the Damascus centre which will have a capacity of 392 trainees, said that Syria's own new oil industry would need a growing number of trained people. Electrical foundations, telephone and water companies were busy extending services to rural areas and also needed skilled people. One company, he said, was ready to take on 80 plumbers for building projects as soon as they could be provided.

In Jordan, Wadi G. Dides, principal of Wadi Seer (capacity 404 trainees), said that the Jordanian government was ready to take all his graduates in the telecommunications field and that civil aviation companies expanding activities through the Middle East, were also asking for more telecommunications experts as well as skilled radio men and electricians.

At the Gaza centre (capacity 369 trainees), the director, Abdel Kaher Nagi, said that last year all his 126 graduates were taken on by the United Arab Republic, and he hoped for the same result, in all branches of trades taught, this year. In Lebanon, in the Gaza Strip and the UAR with which Gaza is associated, the situation is a little more complicated. Refugees, from Gaza are allowed to work in the UAR provided they have definite jobs offered; they cannot enter the country looking for work. However, recently the UAR has started opening up large numbers of places for the graduates from the training centre, for further industrial training. In Lebanon, though refugees do not have the rights of Lebanese citizenship, work is available.

It is likely that a good proportion of the graduates will have to cross international boundaries to obtain work, as has been the case in the past with the smaller number of graduates turned out by centres. The obvious spots are other Arab countries with a developing economy, or with oil wells.

RECENTLY, Mr. Ahmad Tuqan, of Jordan, a seasoned UNESCO expert in general education, toured a number of the Arab countries, particularly those in the Persian Gulf, and returned with enthusiastic reports that there was still a thirsty labour market for nearly all trades, and one which looked like continuing for a while. He cited specially, the Sheikhdom of Abou Dhabi, one of the Trucial States, until recently a small community of some 15,000 people, but where oil has been lately discovered in such abundance that output may eventually rival that of Kuwait, and annual income should reach something like $150 million in a year or so.

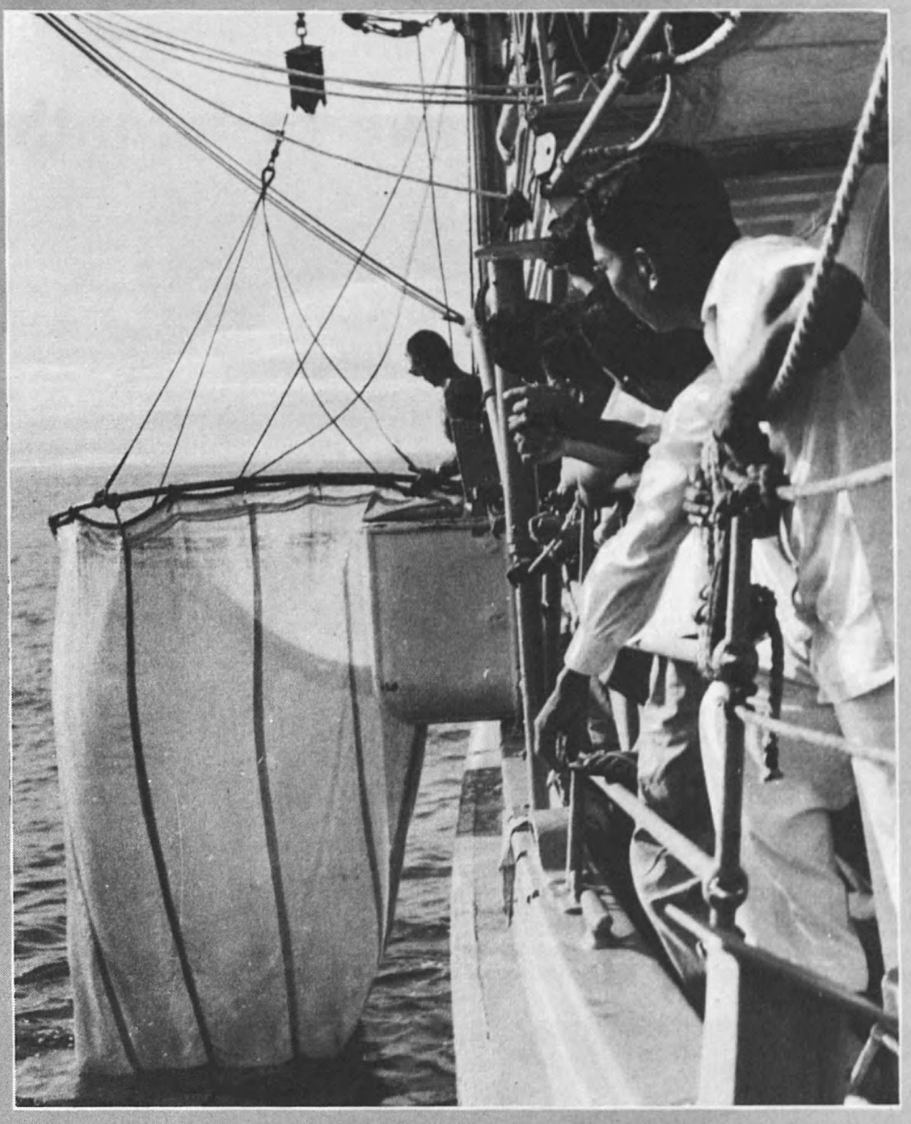
Moreover, the Sheikh Shakhbout plans to use much of his new income in social and economic development for his people. There will be room for many teachers and builders, home economic experts and hairdressers, as well as for pipe-line welders, accountants and auto mechanics.

By making the learning of English compulsory at the vocational centres, trainees are also being better equipped for work both inside and outside the Arab world.

It would be idle, and wrong, to assume that by launching this ambitious vocational and teacher training programme, which can in any case only cater for a small percentage of refugees at the present time, though there is always hope and provision for expansion, UNRWA seeks to find a solution to the problem of the Palestine refugees. That is not UNRWA's job anyway. The refugees, many of them, still cry out after 14 years, to be allowed to return to their homes, a step which, though many today feel to be no longer very practical, is nevertheless acknowledged in U.N. resolutions within the fiamework of a general settlement. Alternatively, they demand compensation.

THE U.N. Conciliation Commission for Palestine is still actively at work, and early last summer combined renewed energy with muted hopes for a possible compromise plan, though political tension has perhaps run too high for anything much to be achieved.

All that can be said in the meantime, however, is that UNRWA and UNESCO are seeking every means to restore to the refugees some economic independence, while at the same time educating their children and training their youth so that, whatever the future may bring, the new generation will not grow up in conditions of stagnation, and will have a chance to play its part in the development of the Middle East.



THE INDIAN OCEAN which represents 14 per.cent of the earth's surface is the least known of the earth's oceans. Since 1959 science has explored its mysteries on three levels—atmospheric, surface and underwater. Right, trainees from South-east Asia at work on the research vessel "Stranger". Unesco - Mattson

20-nation scientific expedition

WILL THE INDIAN OCEAN YIELD ITS SECRETS?

by Daniel Behrman

A peaceful international fleet of forty vessels will be setting out over the next two years on a voyage of discovery in which the factor of the unknown looms almost as large as it did to the first navigators to venture over the horizon in the past.

This fleet is the International Indian Ocean Expedition, history's most ambitious co-operative venture in oceanography, a science as old in its origins as seafaring and yet as new and as challenging as the exploration of outer space. Twenty countries in all are participating. Since 1959 several exploratory vessels have already been cruising the Indian Ocean as part of the Expedition.

These research vessels are to cover the Indian Ocean which represents 14 per cent of the earth's surface and 28 million square miles, of which so little is known that they have been only semi-facetiously termed as "inner space." The mysteries which this expedition is seeking to crack, sound at times as if they had come from the pen of a Jules Verne or an H. G. Wells.

For example, in the northwestern corner of the Indian Ocean alone, running from the Arabian Sea to a line ten degrees south of the Equator, vessels next year will be trying to learn if the actual geological boundary of the African continent extends almost to the middle of the Arabian Sea instead of running along an offshore continental shelf.

Others will be investigating the physical processses of this ocean to find out why it suddenly appears to become deadly to its fish population. In 1957, a Soviet vessel bound from Ceylon to the Gulf of Aden encountered a mass of dead fish floating over 60,000 square miles, a tonnage estimated as equal to the world's commercial fish catch for an entire year.

At one point the expedition will become a combined air-and-sea operation; the atmosphere will be converted into an open "prism," miles in height, by weather planes flying triangles or pentagons with surface observers at the end of each 100 mile leg. The difference in readings at both ends of the "prism" is expected to provide clues to the flow of heat and water vapour over the ocean. This is another step in the process of attempting to learn how

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Hunting the elusive coelacanth

the earth's atmosphere actually works in order to put weather forecasting on a more scientific basis.

Generally speaking, the Indian Ocean itself is a gigantic laboratory for studying the effect of wind on currents. It is the world's sole ocean in which the direction of prevailing winds—and, consequently, that of prevailing currents—changes twice a year with the onset of the northeast and southwest monsoon seasons. Oceanographers are extremely eager to investigate these reversals because they are directly linked to the ocean's fish productivity.

What do currents have to do with fish? Very much, in the case of the Indian Ocean and other tropical seas where a warm layer of surface water blankets cold food-laden deeper layers and prevents normal mixing. Currents produce upwelling of these deeper layers, bringing up "fertilizer" in the form of phosphates and nitrates needed to sustain life.

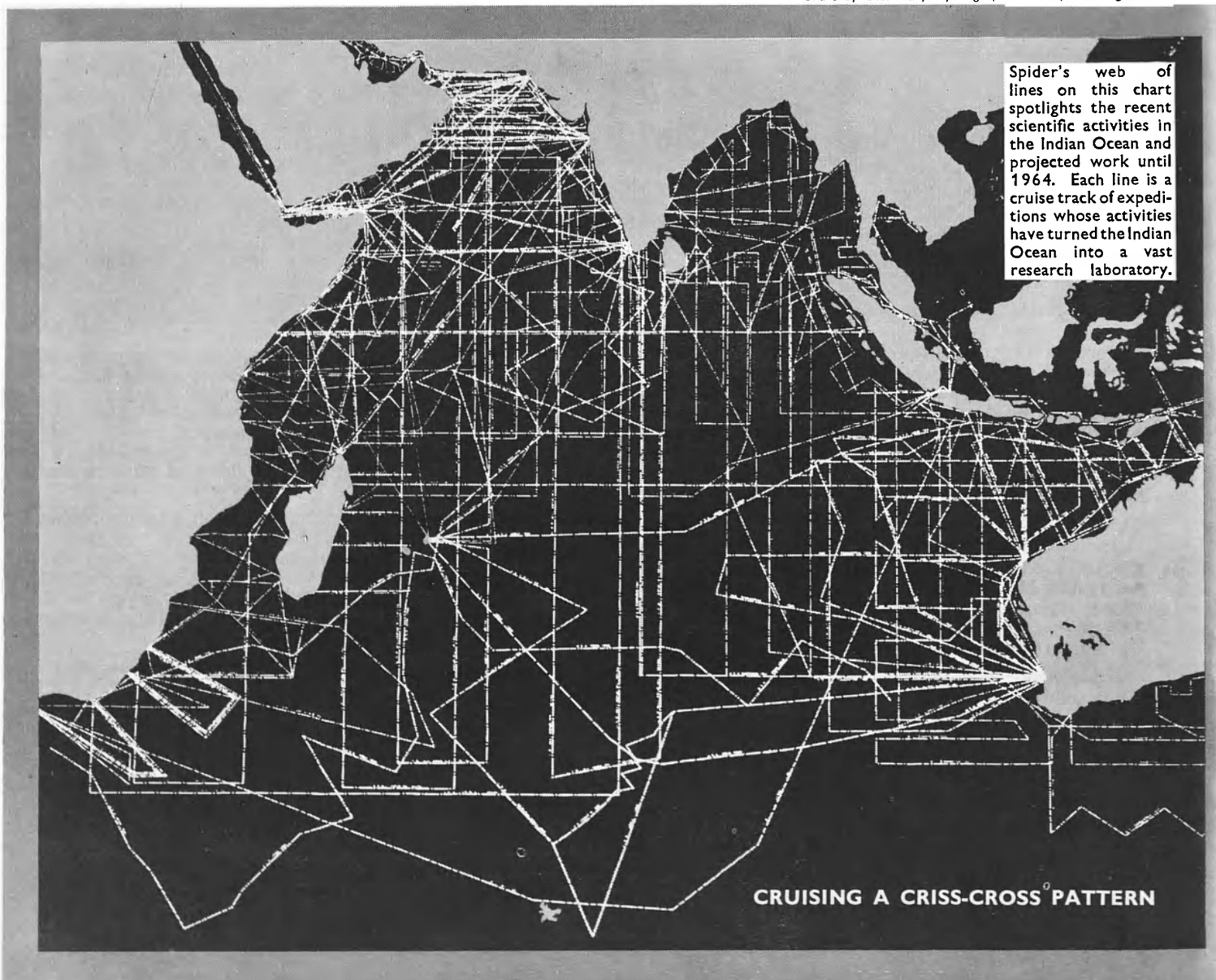
The importance of these studies in the Indian Ocean is obvious. Around its shores live some of the world's most heavily-populated countries. The possibility of "farming" the Indian Ocean for fish protein cannot be overlooked.

Another biological aspect of the International Indian Ocean Expedition is even more appealing to the imagination. In 1964, one vessel is to go out on a latimeria hunt. The latimeria, a species of coelacanth, was believed extinct until scientists learned, almost by accident, that one had been caught in African waters in 1938. Physiologists are anxious to study its waste-elimination processes which are an intermediate stage on the path of evolution leading to present-day fish.

These are some of the highlights of the International Indian Ocean Expedition brought out at a recent meeting held in the United Kingdom. Oceanographers from the Federal Republic of Germany, France, India, Pakistan, the United States and the United Kingdom met at the British National Institute of Oceanography at Wormley to co-ordinate future operations in the northwest Indian Ocean. The meeting was called by the Intergovernmental Oceanographic Commission which, together with the Scientific Committee on Oceanic Research of the International Council of Scientific Unions (the body which organized a similar joint venture, the International Geophysical Year) and UNESCO, is sponsoring the expedition.

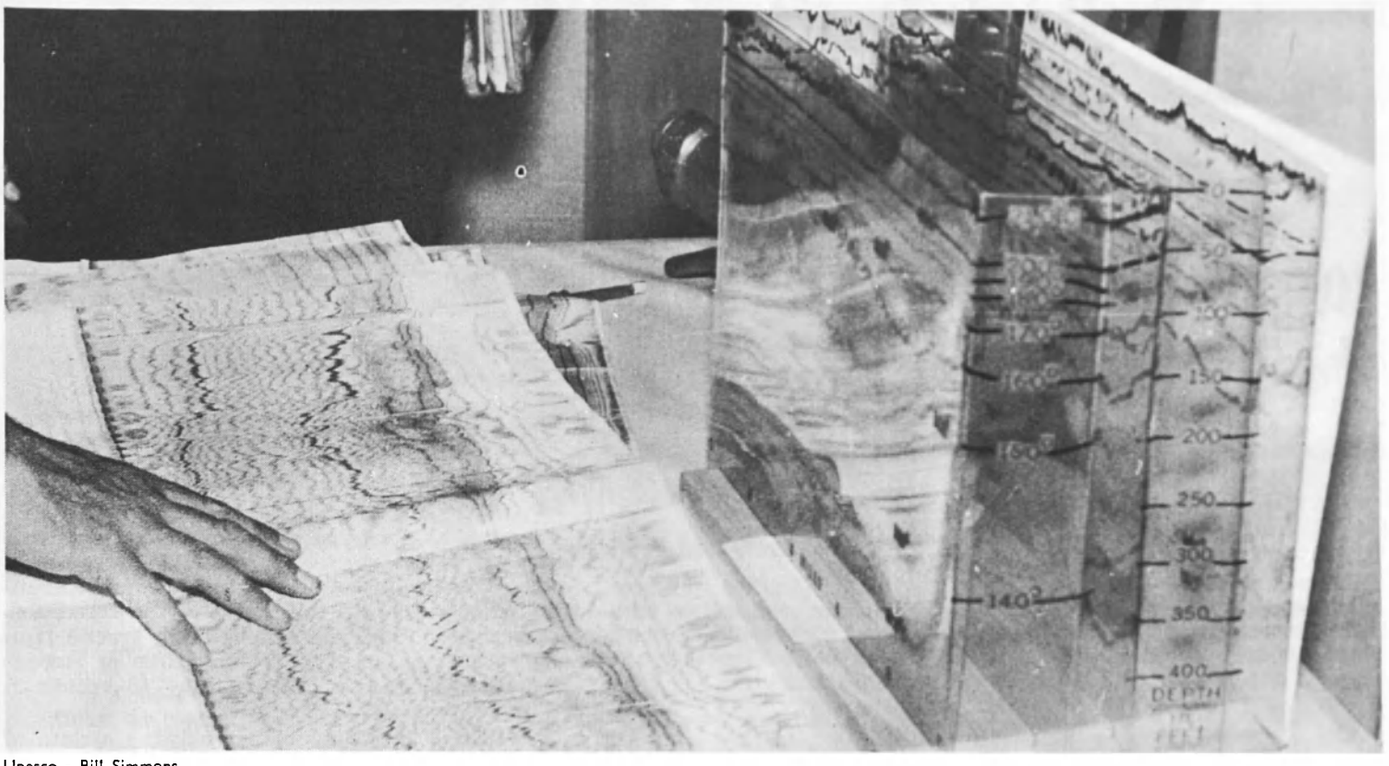
It was an appropriate meeting-place, even though the British National Institute of Oceanography is high and dry in the green hills of Surrey. It stands on a knoll as a plain redbrick structure, but it is surrounded by seabattered buoys, tidal gauges and rows of barrels containing whale ovaries (one of the institute's tasks is to keep track of the world's declining whale population.)

Chart by U.S. Navy Hydrographic Office, Washington



Spider's web of lines on this chart spotlights the recent scientific activities in the Indian Ocean and projected work until 1964. Each line is a cruise track of expeditions whose activities have turned the Indian Ocean into a vast research laboratory.

CRUISING A CRISS-CROSS PATTERN



Unesco - Bill Simmons

OCEAN PROFILE IN PLASTIC. A clear picture of the ocean bottom is shown in relief by the plastic profile (right) used by scientists in their studies of the world under the waters. Beside it is a classic profile chart of the ocean depth. One of the new tools which has transformed oceanography is the precision echo-sounder capable of measuring the outline of the ocean bed to one fathom (six feet) at a depth of 3,000 fathoms.

A closer inspection of the institute in these bucolic surroundings reveals even more startling wonders. One entire corridor is lined like a champagne wine-cellar with hundreds of samples af sea-water from all over the world in glass ampules. A room no larger than an ordinary office is occupied by the North Sea—that is, by a mathematical model where the effects of tides and storm surges on the flooding of coastal regions in Northern Europe are studied.

Some of the equipment being used by oceanographers in the Indian Ocean Expedition has been developed or tested here. Two of these devices serve as excellent illustrations of the new tools which have transformed the science of oceanography within the past decade or so.

One is a precision echo sounder, accurate to one fathom at a depth of 3,000 fathoms. This instrument has enabled geophysicists to study the great abyssal plains of the ocean floor sloping almost imperceptibly (with gradients less than one in one thousand.) Previous sounders had a margin of error as wide as fifty fathoms—which meant they could "see" a plain as rolling hills and valleys.

The second is a deep-water current-measuring instrument which can be set to float at a predetermined depth where it drifts and emits a radio signal (hence its nickname of "pinger") enabling it to be tracked. This instrument, which has also been called an "underwater sputnik," has helped revise many long-standing ideas concerning the stillness of the ocean depths. For example, it has detected a current moving twenty miles a day at a depth of 4,000 metres.

The activities of the British National Institute of Oceanography are under the efficient and good-natured command of Dr. G.E.R. Deacon, who also served as chairman of the meeting to dicuss operations in the northwest ocean. Dr. Deacon, at fifty-six, is one of Britain's leading oceanographers and he is typical of the scientist who has had long months of patient observation at sea. He seldom speaks and, when he does, it is in a low tone calculated not to distract his fellow scientists working under conditions reminiscent in many ways of the long voyages in the days of sail.

As a matter of fact, Dr. Deacon is the first to remind a landsman that the study of winds and currents was a flourishing science during the heyday of the sailing vessel until it fell into a state of wrongful neglect with the advent of steam. Present-day oceanography has revived this study with modern techniques, particularly the analysis of waves. Precise information on wave conditions has enabled certain vessels to cut their time across the North Atlantic by 10 per cent in recent years.

Oceanographers, in general, have a more than sentimental interest in sailing vessels. Right now, for example, the three-masted schooner "Vema," an American research ship operated by the Lamont Geological Observatory of Columbia University, is cruising the Indian Ocean. At low speeds or while heaving-to for observations, such a ship can be more comfortable than a more modern vessel.

It is interesting to note that the "Atlantis II," the new research ship now being built by the Woods Hole Oceanographic Institution in the United States, is powered by steam reciprocating engines rather than by turbines or diesels. This "antiquated" technique offers less noise interference in certain studies, particularly the propagation of sound. The "Discovery," Britain's new research vessel launched last July and scheduled to cruise the Indian Ocean next year, has adopted diesel-electric drive as an economic solution to problems of low-speed operation. Both new vessels will be equipped with "wells" amidships allowing instruments to be lowered directly into the sea.

In addition to "Atlantis II" and "Discovery," a new 2,200-ton research ship now being constructed in the

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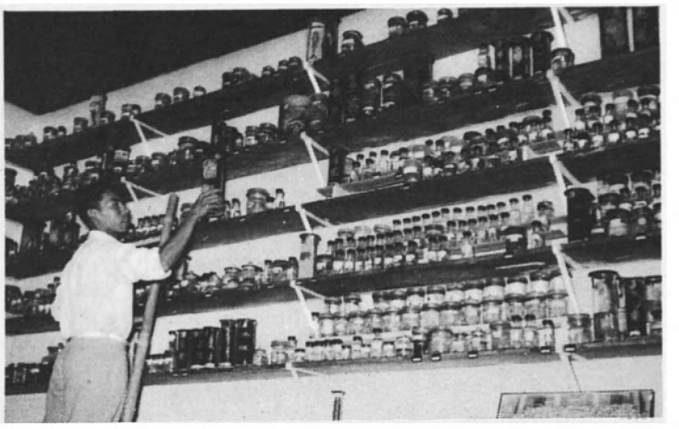


The oceans are one of the world's last unexplored frontiers whose topography and living things, plant and animal, are now being revealed by patient research. Specimens like those shown here at the Nathrang Institute of Oceanography, Vietnam, will be studied for years before scientists find all the solutions to their many mysteries.

Unesco - Pierre Pittet

40,000 miles of sea-bed mountains

Federal Republic of Germany will take part in the Indian Ocean Expedition. This means that some of the world's most modern oceanographic vessels and techniques are to be tested there.

These new vessels offer the advantage of being able to carry teams of scientists from different disciplines on the same cruise which is actually the equivalent of two or three cruises aboard smaller vessels previously used. The largest ship to work in the Indian Ocean so far has been the Soviet Union's "Vityaz" listed at 5,700 tons.

The "Vityaz" made an important contribution to the Expedition in 1959 and 1960 by investigating layers of hydrogen sulphide in the northeastern Arabian Sea and in the Bay of Bengal, from depths of 125 to 1,000 mètres. This was also found to be the most oxygen-starved layer of the ocean and it will be the subject of further study in the next two years to examine its influence on marine life.

In geophysics as well, the Indian Ocean Expedition has already produced interesting findings. This was the case of the nine months' cruise of the "Owen," a British vessel, which investigated the Western Somali basin of the Arabian Sea. Gravity and magnetic surveys of this area seem to indicate that the African continental structure continues more than 200 miles out to sea towards the Seychelles Islands.

To explain the results of these surveys, a theory has been advanced that the thick sedimentary layers of the continent continue under the ocean. Next year, the new "Discovery" and the "Owen" will use underwater seismic explosions to determine the nature of the ocean floor in this region. These two vessels, using underwater photography apparatus as well, will also seek to chart the Carlsberg Ridge, part of a continuous mid-oceanic ridge system comparable to a mountain range 40,000 miles long linking the world's oceans.

In all, a total of nineteen oceanographic research vessels will be at work in the northwestern Indian Ocean next year. Among them will be ships from two of the countries directly concerned with the results of the expedition, India and Pakistan. Both are also offering special facilities—such as exemptions from harbour fees or storage space for explosives used in seismic tests—to vessels in the expedition.

On land, Pakistan is adding to her existing system of tidal gauges while India has completed the building for an International Biological Centre at Cochin to be operated with UNESCO assistance. Specimens taken by ships will be sent to Cochin for preservation and study.

The expedition has also succeeded in enlisting the aid of merchant and naval vessels crossing its territory for supplementary observations. "Air support" will come in May, June and July of 1963 in the form of meteorological planes from the United States Weather Bureau and the Woods Hole Oceanographic Institution.

It fell to the men who met at the British National Institute of Oceanography to co-ordinate these efforts by individual nations in order to avoid duplication of cruise tracks and to establish agreement on such matters as the choice of common reference stations for benchmark observations or the maintenance by one ship of recording buoys set out by another. Agreement was reached in a manner as simple and as straightforward as the oceanographers themselves who are accustomed to working on the high seas, a world without political boundaries.

And this will not be the least of the achievements of the International Indian Ocean Expedition.

THE UNESCO PHILATELIC SERVICE

The thousands of persons who have given their lives serving under the U.N. Flag, including staff members, truce observers and military personnel of member states, are honoured by the first U.N. memorial stamp (far right). Stamp from Panama (centre) is one of many issued by U.N. members honouring Dag Hammarskjold. Other stamps, issued by the United Arab Republic, Afghanistan and Argentina, mark Unesco's 15th anniversary last year. The UAR stamp also publicizes Unesco's efforts to save Nubia's ancient monuments. All these stamps can be obtained from Unesco Philatelic Service, Place de Fontenoy, Paris (7e), which, as agent in France of the U.N. Postal Administration, stocks all U.N. stamps and first day covers now on sale.

Letters to the Editor

WHY ANTARCTICA IS COLDER

Sir,

As our earth is orbiting around the sun on approximately the equator line—west to east—and approximatively that position all the year round, why is it that the North Pole is warmer than the the Antarctic and why are the Eskimoes able to live in the North?

Colin R. Brown
Coolangatta, Queensland, Australia

Ed. Note:

Dr. G. Laclavère, President of SCAR, The Special Committee on Antarctic Research, has been kind enough to furnish us with the following information: "To produce a complete answer for your Australian correspondent would really call for a lengthy paper. However, here are a few salient facts on the subject. What he says is more or less true; a more precise astronomical calculation would show that, taken over the entire year, the South Pole enjoys more sun-hours than the North Pole.

The reasons why the South Pole is colder than the North are manifold, but basically there is the fact that the South Polar area is a vast, raised continent, entirely covered by an ice-sheet, whereas the North Pole benefits from the moderating influence of the ocean on which the ice-pack rests. Antarctica is screened from the heat of the equatorial and tropical areas of the world by the circulation of the peripheral winds. Here are several basic reasons which should satisfy your correspondent. But you might also tell him that the reasons why so much ice has accumulated in the Antartic rather than in another region of the world are still something of a mystery."

'UHURU' IN NAIROBI

Sir,

I note that mention was made in your March 1962 issue (The Awakening African Cinema) of the African film "Liberté I". This film has now been shown around the world and, dubbed in Swahili under the title of "Uhuru", it has had a tremendous success in Nairobi, Kenya where 30,000 people witnessed its *première*. Hundreds poured in from the outlying districts and those who could not get in stood on the tops of buses, lorries and cars as far away as six hundred yards from the massive, specially erected screen. The tremendous crowd surged forward chanting "Uhuru", to grasp the hands of the stars, Manasseh Moerane of South Africa and John Amata of Nigeria, who came specially to Nairobi. Mr. Amata said, "This film will make Kenya the land of expectation and hope for Africa. It is the right answer, the right place, the right time and you are the right people to take it to all Africa." Nahashon Ngare and Stanley Kinga, who dubbed the film into Swahili, said, "We are doing this as our part in the struggle to answer tribalism and create fundamental and lasting unity and make leaders and led incorruptible and unselfish as the only guarantee for a free, full life for all in an independent Kenya."

J. Poncy
Cologny, Geneva, Switzerland

A SUNKEN OASIS

Sir,

In the special issue (May 1962) of THE UNESCO COURIER on "Thirsty Lands", you published photographs of a sunken oasis: "A few years ago an oasis cast its green shade near Fort Flatters in the Sahara. Today it has been swallowed up by the creeping sands and only the tops of three palm trees mark its grave." As a postscript to this I am sending you a photograph I took of this oasis in 1923 when I often had occasion to visit it. At that time the little pool there provided enough water for growing a few vegetables and several patches of millet, and there were also several fig trees and vines. I was one of five Frenchmen who lived on the edge of the oasis which was then the home of about a dozen Touareg families. The reason for the poor quality of the photo is that it was developed at Fort Flatters, where the water is heavily impregnated with magnesium.

V. Mazzoni
Oran, Algeria

LOST HYMNS OF GEORGIA

Sir,

As a composer and specialist in folk music, I was greatly interested by "Lost Hymns of Georgia" (May 1962) in which a Soviet linguist, Dr. Pavle Ingorokva, explained how an ancient musical mystery was solved. I have often had to face similar problems during research in the Middle East into Biblical music written according to the Sephardic Jewish oral tradition. In Alexandria, in 1929, I published a short brochure in French, in which, under the title of "Music of the Torah", I grouped all the material I had collected. While admiring, without reserve, the results already obtained with regard to the Georgian music, I should have liked Dr. Ingorokva to explain to us the problems of the rhythm or duration of sound with the same precision that he has outlined details of the pitch and subsequent pattern of tones.

Alberto Hemsi
Aubervilliers, France

Sir,

Permit me to suggest some amendments to Dr. P. Ingorokva's "Lost Hymns of Georgia". They concern only those points which obligate any musicological communication, even when addressed to the general public. Mostly the translator and not the author, seems to have been at fault.

1. Both the nine-stringed square instrument in the miniature and the triangular one photographed (p. 27), were designated as "lute", which neither one actually is. In the miniature we probably have a kind of psaltery (musicologically: zither—strings over a soundboard, with no neck or yoke). This is either held vertically, or only represented thus in order to evade a problem in perspective. The instrument on p. 27 is an angular harp (strings stretching from a separate neck and meeting the plane of the soundbox vertically). As a "lute" we would define the combination of body and handle-like neck, with strings parallel to the soundboard, as exemplified by the various kinds of fiddles, or the Caucasian "Tar".

2. In the same miniature, the wind instrument is more probably a trumpet of sorts, and not a "flute", even though the painter made its player hold it obliquely. At most it could be a kind of shawm; if however, the miniature is supposed to illustrate Psalm 150, a trumpet-like instrument is indicated. The "tabor", in the same miniature, might better be called a barrel-drum.

3. The bronze faun playing a wind instrument designated as "aulos" (flute) with bulging cheeks and a wrinkled forehead both indicate—even though the actual instrument is missing—the typical effect of blowing a double-reed instrument, which the ancient aulos in most cases indeed was. Therefore—"aulos" (oboe).

4. Two points on page 27: for "voice" substitute "mode" or, more appropriately, the Byzantine term "echos"—melodic class. (The author's statement raises a musicological point which cannot be discussed here); the accompanying voices in Western art music for church use (not "Roman Catholic church music", which is non-polyphonic to this day) began to be written out from the 9th century onwards (not the 13th).

The great value of Dr. Ingorokva's communication of course remains unaffected in principle.

Bathja Bayer
Haifa, Israel

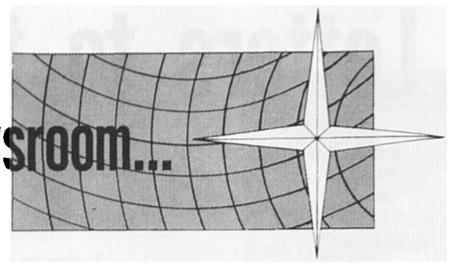
TOO 'HEAVY' FOR TEACHER

Sir,

I am continually receiving THE UNESCO COURIER and the Orient/Occident Bulletin. I should appreciate if they were a little more popular. The articles are so "heavy" that it is difficult to find time to read and use them when the days are filled with teaching. We teachers can seldom find time to read more than what we can directly use in our teaching, and THE UNESCO COURIER does not give us much of that.

Dr. Sten Rodhe
Malmo, Sweden

From the Unesco Newsroom...



TRIUMPHS OF SPACE RESEARCH: Two major scientific achievements in connexion with space research—the launching of the Telstar communications satellite on July 10 and the successful completion of the longest-yet manned space flights on August 15—have been hailed by Unesco. Making possible the first transatlantic TV transmission, Telstar marked a new era of long-distance communication. Congratulating the United States, Unesco's Director-General described the event as "a significant advance for the free flow of information, one that opened up new possibilities in international understanding." The Director-General congratulated the Soviet Union on the feats of cosmonauts Adrian Nikolayev (1,663,000 miles in 94 ½ hours during 64 orbits) and Pavel Popovich (1,247,000 miles in 71 hours during 48 orbits). These latest achievements of Soviet science, he said, "marked an important further advance toward the scientific exploration of outer space."

HOW SALTY IS THE SEA? Scientists now find the answer by testing the electrical conductivity of sea-water samples which gives a more precise indication of the salt content than the chemical method hitherto employed. Scientists met at UNESCO's H.Q. in Paris, recently to discuss this question whose importance is related to design and construction of ships and harbours, the prevention of coastal erosion and the behaviour and migration of fish.

ELECTRONIC AID FOR NURSE: British scientists have now a device which can register changes in a patient's pulse, breathing, blood pressure or temperature and flash them to a central control panel. Its purpose is not to provide an electronic substitute for nurses but to free trained personnel from routine tasks.

KINDERGARTEN LINGUISTS: Children can begin to learn a second language even before they can read and write their own with no detriment to the development of the first language, to intellectual growth or general school attainment, according to specialists from 11 countries who met recently in Hamburg. The meeting convened jointly, by the UNESCO Institute of Education and the UNESCO Dept. of Education, recommended that a second language should be taught in kindergarten.

GIANT GAS PIPE: The world's biggest gas pipeline is being built in the U.S.S.R. from Ghazli in Uzbekistan (source of the gas supply) to the Urals—a distance of over 2,500 miles. Cheap gas will replace coal which has to be transported to the Urals. This is the first time that pipes of over three feet in diameter have been used to transport gas.

GUIDE TO MUSIC FILMS: Designed to serve as a teaching aid in music education throughout the world, the first international catalogue of music films has been published by UNESCO with the aid of the International Music Council and the International Society for Music Education.

CLASSROOM NEWSROOMS: One school out of three in the Federal Republic of Germany has its own magazine and two out of three schoolchildren buy it regularly. Journals edited and published by schoolchildren now number 570.

U.N. IN PICTURES: A pictorial record of the men, women, events and places that have shaped the story of the United Nations during the past 16 years; has now been presented in "Pictorial History of the United Nations" by Jacob A. Rubin (Published by Thomas Yoseloff, New York, London and Toronto; $7.50 and 42/-stg.) .

WESTERN ART FOR THE EAST: More people in India will be able to study the art of the West thanks to a special gallery which the Government has decided to set up in the recently opened National Museum in New Delhi. The Museum will organize guided tours, temporary exhibitions and lectures and, as its collections of western art increase, will become a centre for exchanges with museums in other Asian countries.

GERHART HAUPTMANN CENTENARY: The Schiller National Museum in Marbach (near Stuttgart) has opened a memorial exhibition to mark the centenary of the birth of Gerhart Hauptmann, the German playwright and Nobel prizewinner (See Sept. issue of THE UNESCO COURIER). The exhibition, comprising some 750 documents—photographs, manuscripts and first editions—will remain open until October 31.

MOVIES IN MUSEUMS: In collaboration with the International Council of Museums, UNESCO is making a world survey of film projection rooms and of libraries of art and cultural films attached to museums with the aim of encouraging the wider showing of cultural documentary films. Similar surveys will cover libraries and universities.

A NEW MINERAL—'GAGARINITE': Scientists from the U.S.S.R. Academy of Sciences Institute of Geology and Mineralogy have discovered a new mineral which they have named "gagarinite" in honour of the world's first cosmonaut. The rare earths which compose more than 50% of gagarinite are elements widely used in electronics and hard-alloy metallurgy and they may therefore be used in the construction of future spaceships.

NEW EUROPEAN SCHOOL: In addition to the "European" schools already existing in Belgium, Italy and Luxembourg, one is to be built at Karlsruhe in the Federal Republic of Germany. It is primarily intended for children of atomic scientists who work at the European Institute for Transuranic Elements, now being constructed near Karlsruhe by EURATOM and the Society for Nuclear Research.

AID FROM ALPS TO ANDES: Mountaineers of Valais in Switzerland have generously answered an appeal to help poverty-stricken Indian mountain-dwellers in the Ayaviri region of southern Peru. After hearing, through films and lectures, about the plight of the Indians, the Swiss villages have generously contributed towards a fund which will be used to open a hospital, maternity clinic and schools. Nurses and technicians from Valais will also travel to Peru to help the Indians.

NEW TAGORE ANTHOLOGY: A 400-page anthology of writings by Rabindranath Tagore (See THE UNESCO COURIER, Dec. 1961) has just been published by The Hyperion-Verlag in Freiburg, Federal Republic of Germany. Arranged by Professor Amiya Chakravarty, who was Tagore's secretary for many years, it includes travel-journals, poems, plays, essays on education, art and literary criticism, short stories and conversations with Einstein, Romain Rolland, H. G. Wells and other famous figures.

ASTRONOMICAL TASK: An arithmetic teacher at an elementary school in Osaka, Japan, recently gave his class the following task. "Count from one to 100 million by tomorrow." The pupils began counting aloud, but three hours after starting the children had only reached 4,000. The children's parents protested to the school authorities and the teacher apologised for having imposed such a mammoth task: it would have taken the children four to five years, counting 24 hours a day to finish this item of homework.

Flashes...

■ *Each year* 3,000,000 *people die of tuberculosis and* 3,000,000 *new cases appear. Some* 15 *million people are estimated to suffer from this disease.*

■ *Forty-three countries have now joined the* UNESCO*-sponsored Universal Copyright Convention under which states grant foreign works the same protection accorded works by their own nationals. Panama was the latest country to join.*

■ *A world plan designed to reduce adult illiteracy by* 50% *within ten years has been drawn up by experts meeting at* UNESCO*'s H.Q. in Paris. Today an estimated* 700 *million people (half of the world's adult population) cannot read or write.*

■ *Soviet engineers have drilled a hole nearly* 16,000 *feet deep in Azerbaijan for special studies of the earth's crust. Work has begun on two more bore-holes which should reach* 23,000 *feet, and still deeper ones are planned.*

■ *Floating robot laboratories are to be used by the International Ice Patrol in the North Atlantic to record information on the presence of icebergs in the shipping lanes.*

■ *Replicas of the Gutenberg Bible, the masterpiece printed from movable type in* 1455, *have been printed in the United States in two-volume sets priced at* $750. *The last sale of an original Gutenberg—of which only* 47 *known copies survive—brought over* $500,000.

Imp. GEORGES LANG, PARIS. IMPRIMÉ EN FRANCE.

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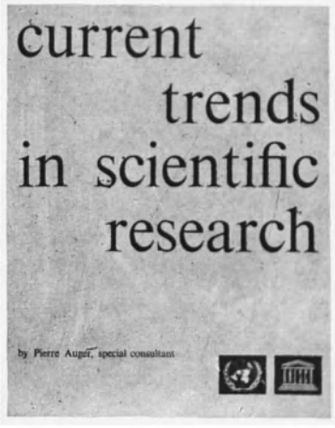

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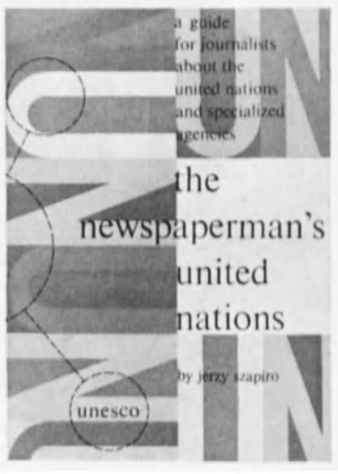

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J. Gilgendorf — National Museum of Georgia, Tiflis

NEW FIND IN PRIMITIVE PAINTING

Niko Pirosmanashvili, called Pirosmani, was a Georgian painter who died 45 years ago in utter obscurity, and his very place of burial is unknown. Though his name is now a little known in the Soviet Union, he is totally unfamiliar to art lovers in other countries. Yet he deserves to rank among the great masters of modern primitive painting. Above, "The Prince", detail from "Three Princes Feasting in a Meadow", which is reproduced on page 23.